

Figure 1

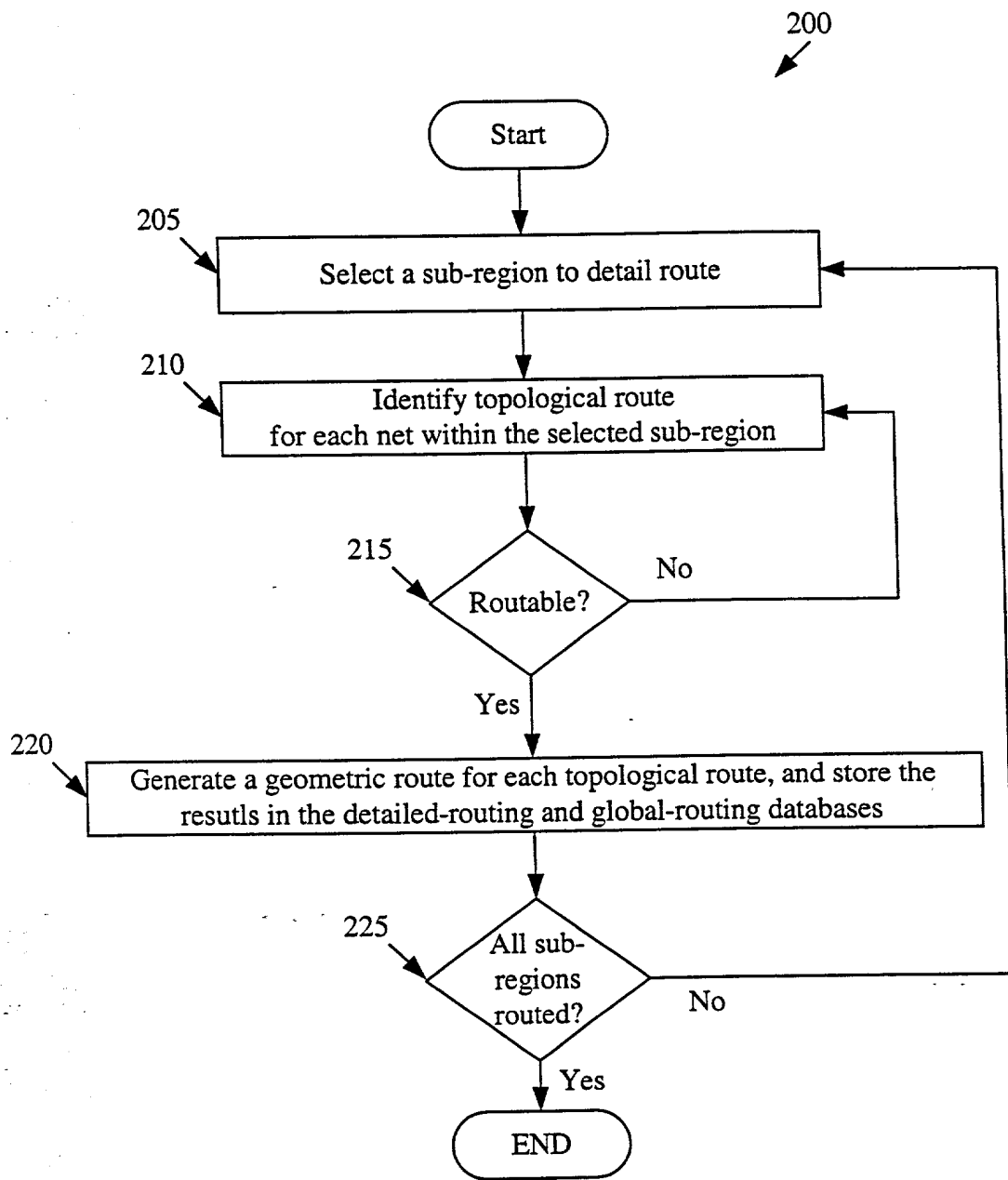


Figure 2

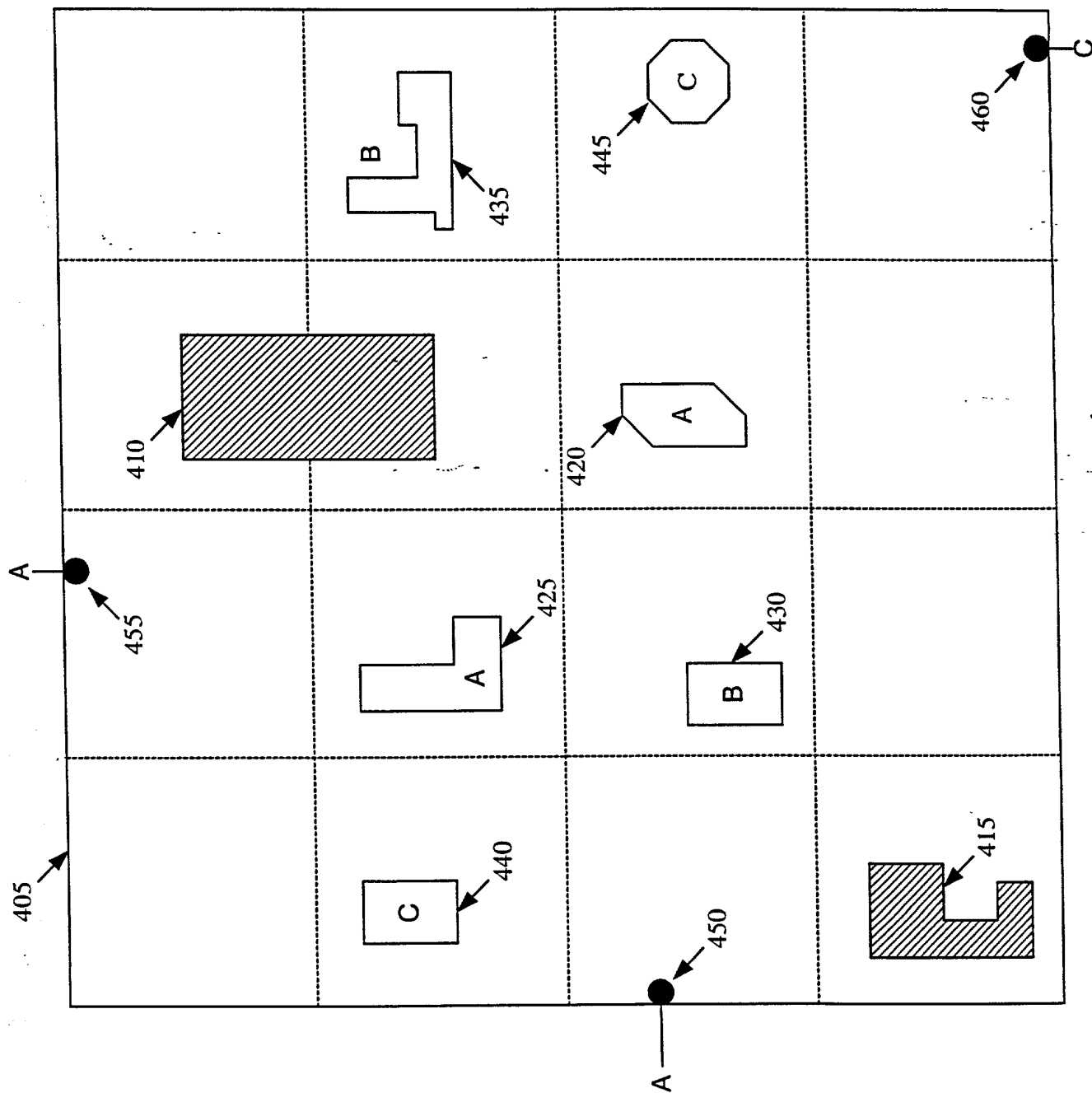


Figure 4

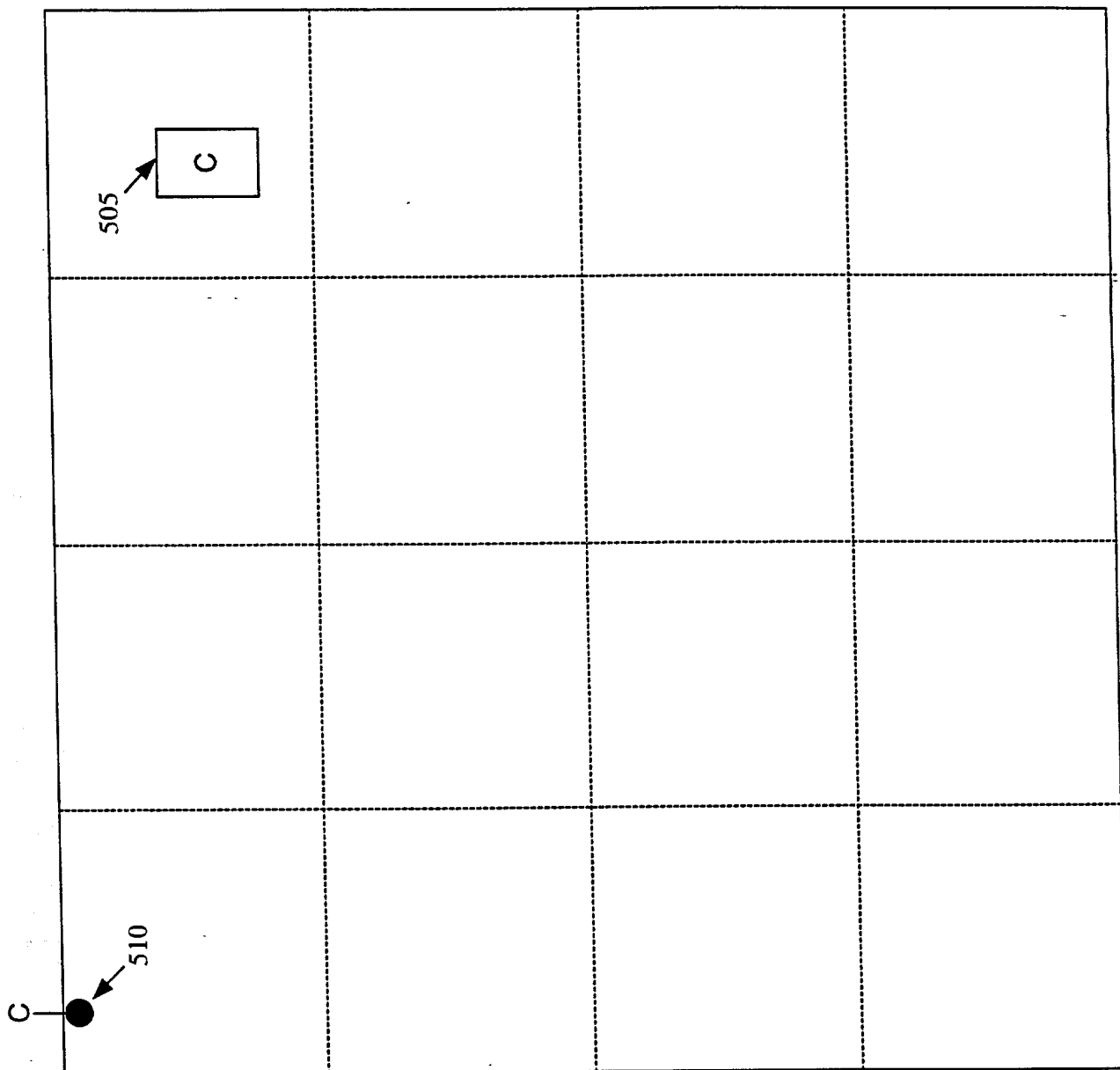


Figure 5

- List of Geometries
 - Each Geometry including a sequence of points & layer assignment
- Bounding box of the region
- Array of layer properties
 - Minimum wire size
 - Minimum spacing
 - Via sizes
 - Cost/Unit
- Netlist specifying a number of nets
 - Each net specifying a set of pins
 - Each pin specifying a set of ports
 - Each port specifying a set of geometries

Figure 6

- List of Geometries
 - Each Geometry including a sequence of points & layer assignment
 - List of connection nodes inside each pin geometry
- Bounding box of the region
- Array of layer properties
 - Minimum wire size
 - Minimum spacing
 - Via sizes
 - Cost/Unit
- Netlist specifying a number of nets
 - Each net specifying a set of pins
 - Each pin specifying a set of ports
 - Each port specifying a set of geometries
- For each layer, a graph specifying
 - Nodes
 - Edges
 - Faces

Figure 7

Face
<ul style="list-style-type: none"> -Reference to 3 edges -Reference to 3 nodes -Up to two references for up to two face item

800

Edge
<ul style="list-style-type: none"> -Two references for up to two faces of the edge -Capacity -Flow -Constrained -Linked list of items on the edge starting with one of the edge's nodes and ending with its other node

900

Figure 8

Figure 9

Node
<ul style="list-style-type: none"> -Net Identifier -One or more planar-path references to adjacent topological items in the same planar path -A pair of via-path references to up and down topological via items -A references to list of edges connected to the node -For each edge, an edge reference to the next or previous topological item on the edge -A reference to the geometry of the node -Vertex number identifying the vertex of the geometry -Location of the node

1000

Figure 10

Edge Item
<ul style="list-style-type: none"> -Reference to its edge -Net Identifier -A pair of planar-path references to adjacent topological items in the same planar path -A pair of edge references to the next and previous topological item on the edge

1100

Figure 11

Face Item
<ul style="list-style-type: none"> -Reference to its face -Net Identifier -Up to 3 planar-path references for adjacent topological items in the same planar path -A pair of via-path references for up and down topological via items -Bounding polygon that defines legal face item locations -Constraining Points and Distances

1200

Figure 12

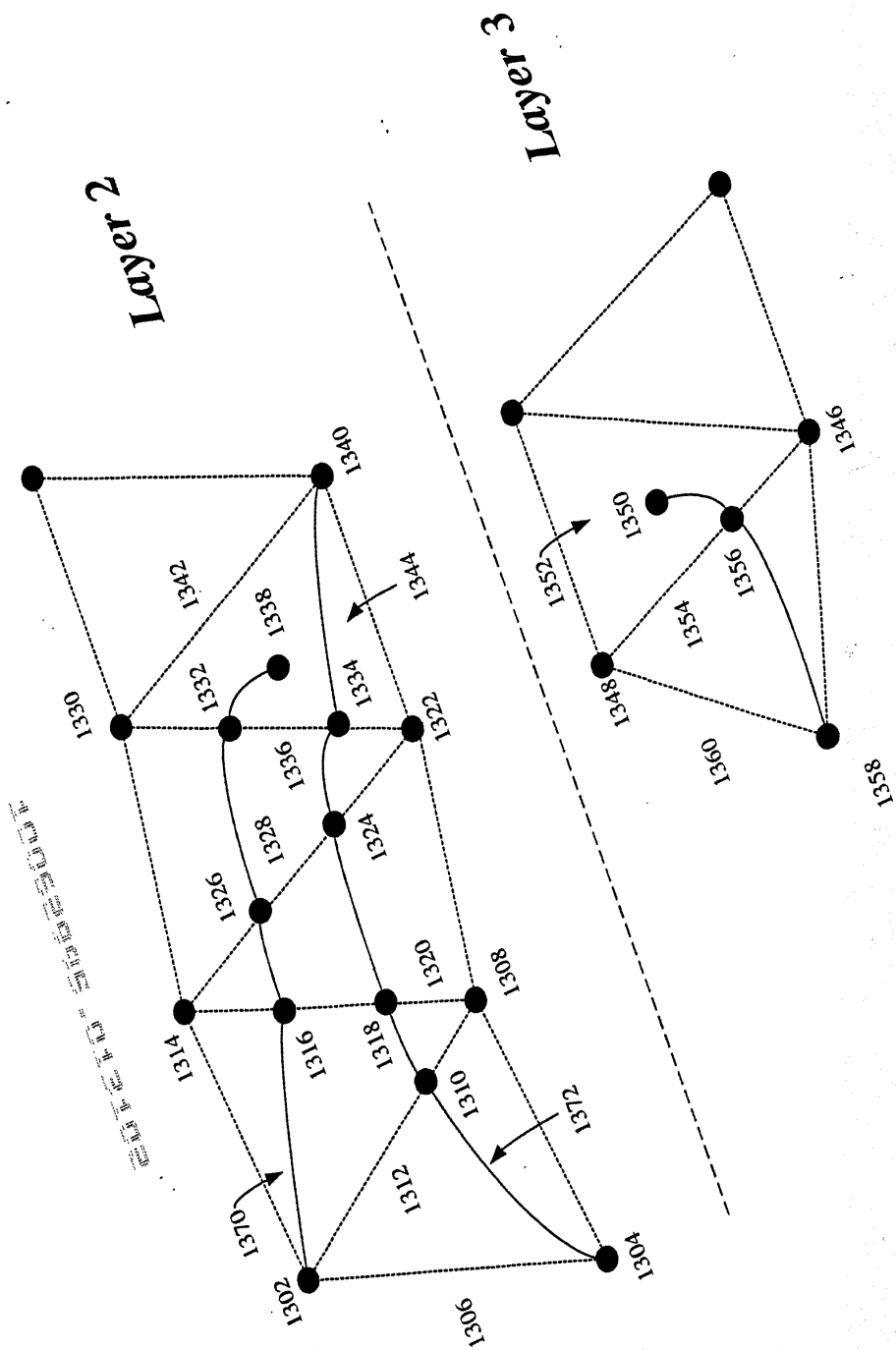


Figure 13

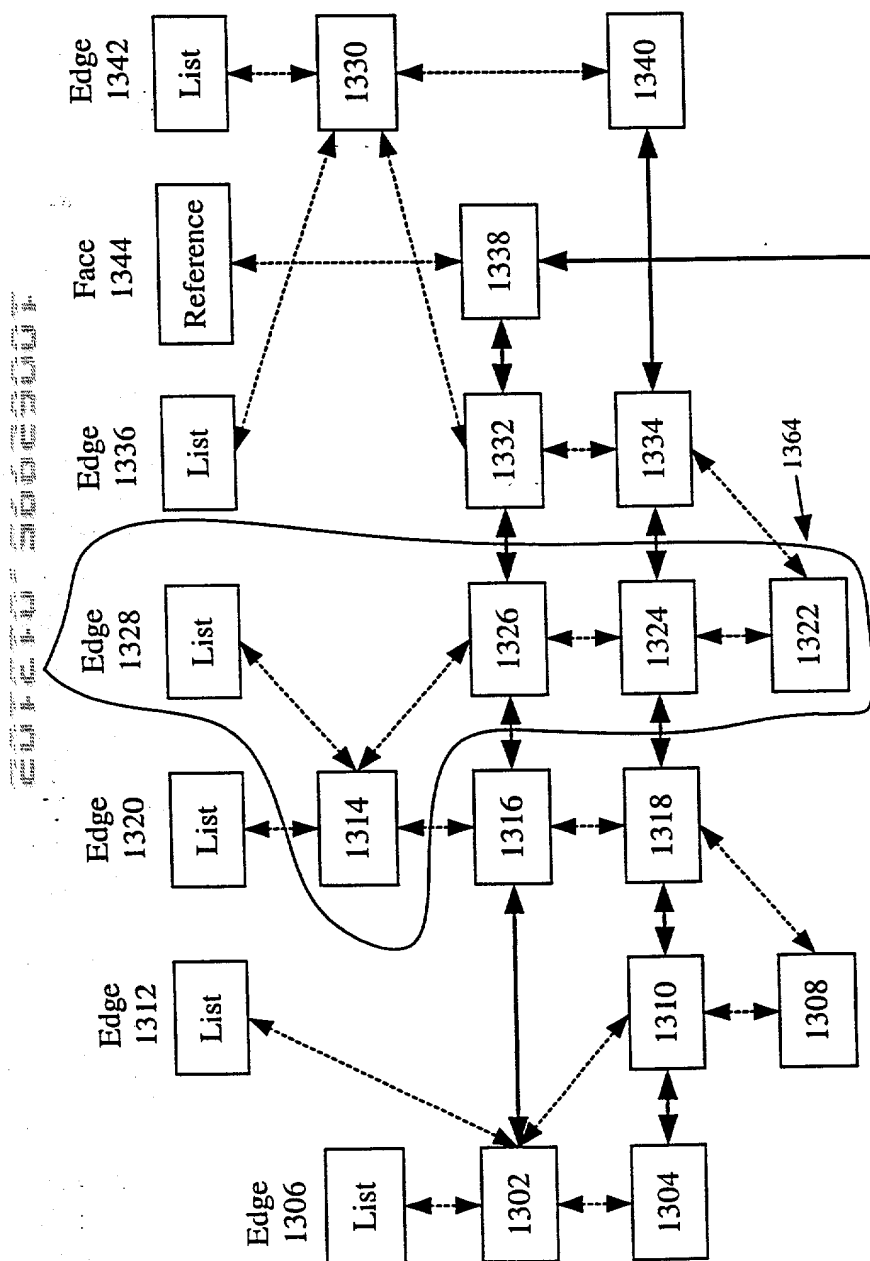


Figure 14

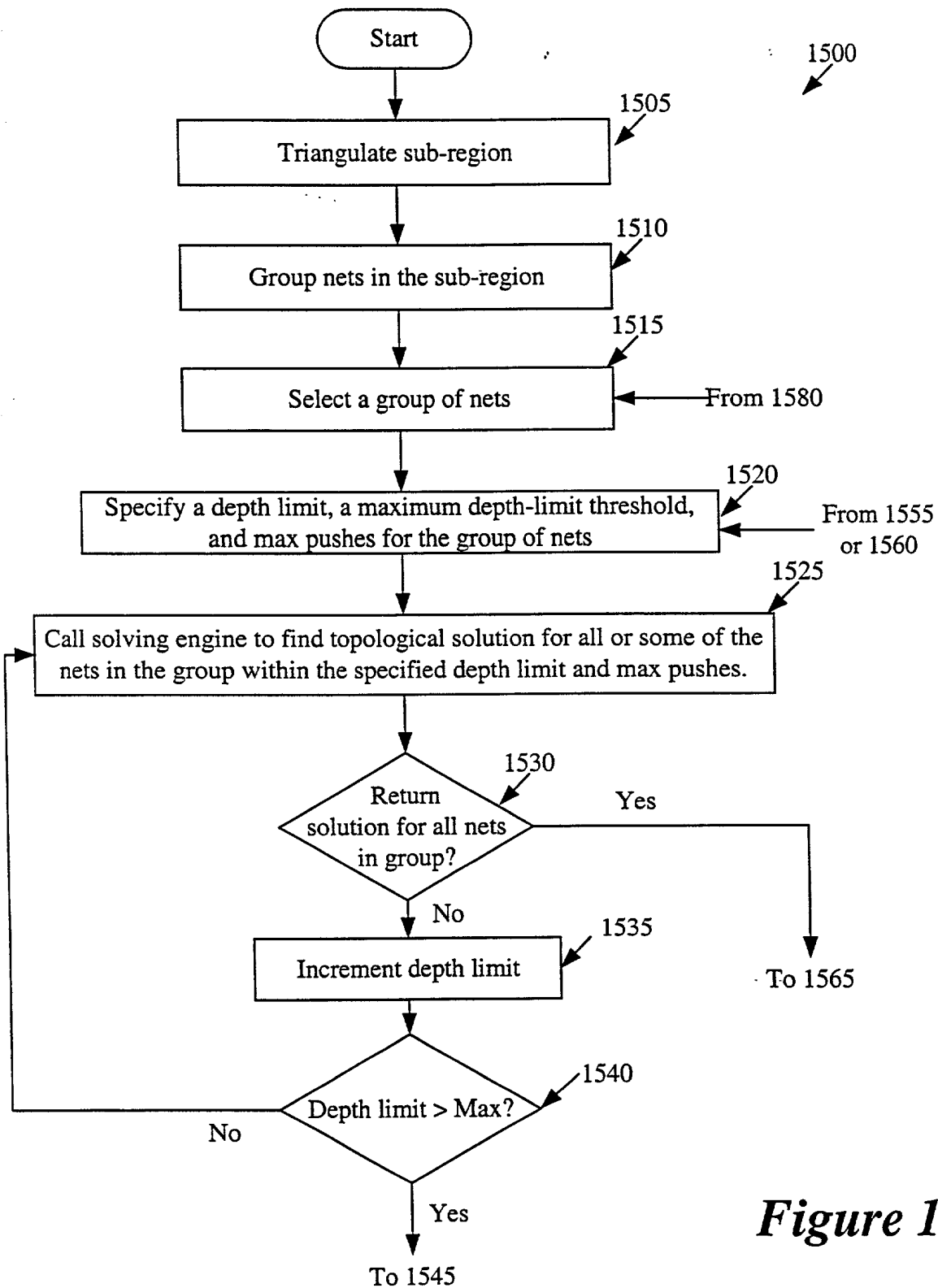


Figure 15A

Figure 15: *Figure 15A*
Figure 15B

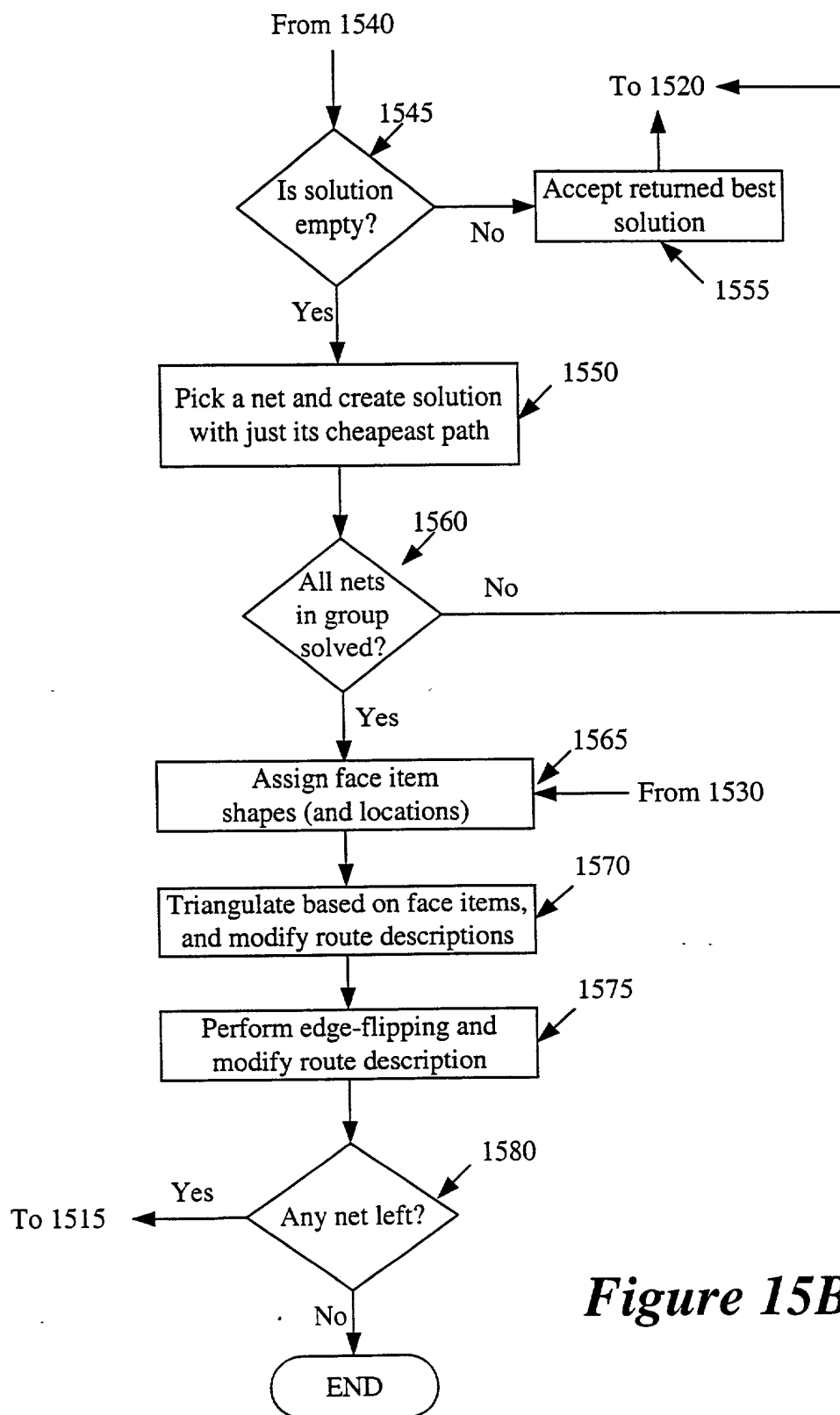


Figure 15B

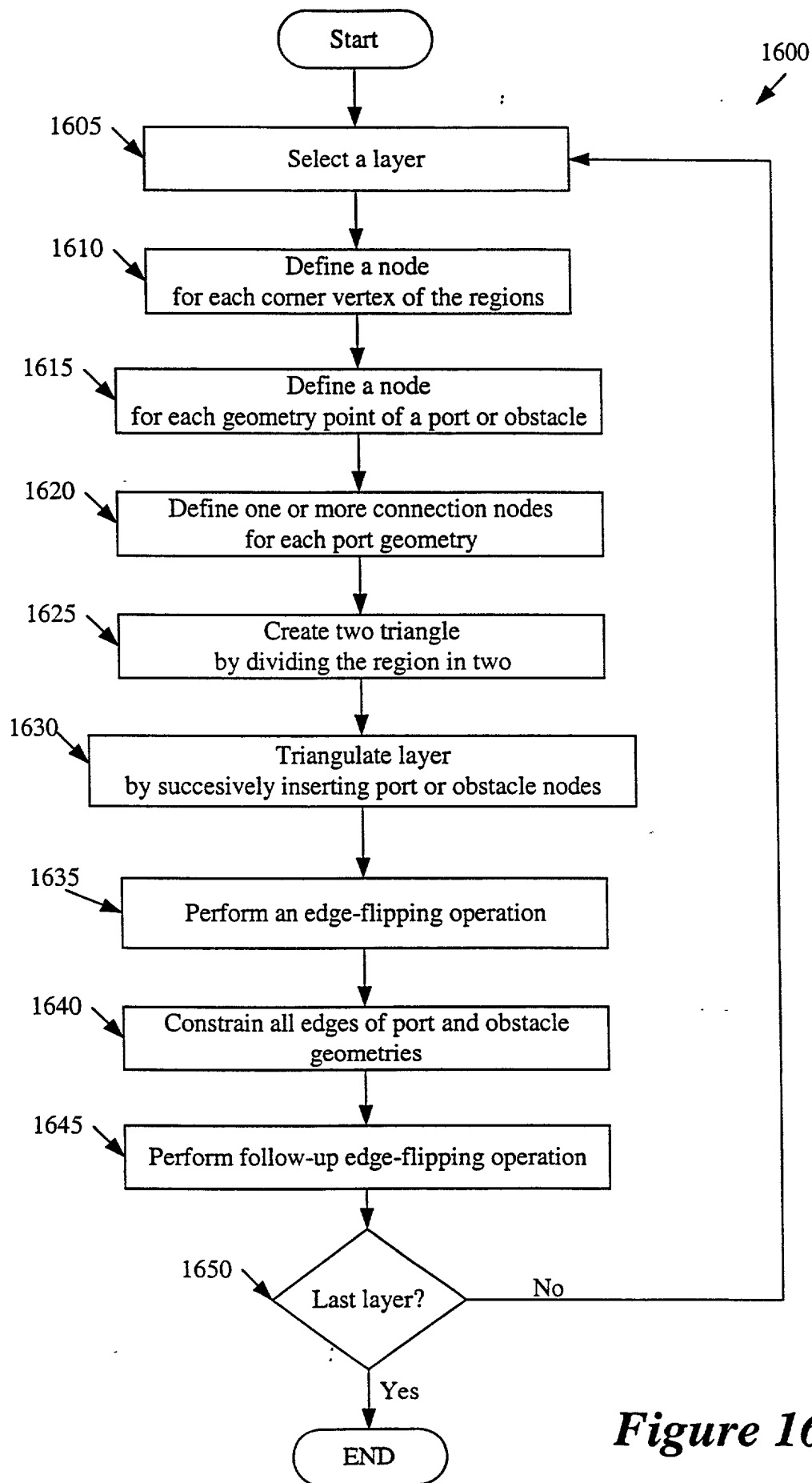


Figure 16

Figure 17 is a diagram illustrating a 4x4 grid of squares. The grid is defined by solid lines. The squares are separated by dashed lines. The grid is labeled with 'A' at the top left, 'A' at the bottom center, and 'C' at the top right. The squares contain various geometric shapes and points, labeled A, B, and C.

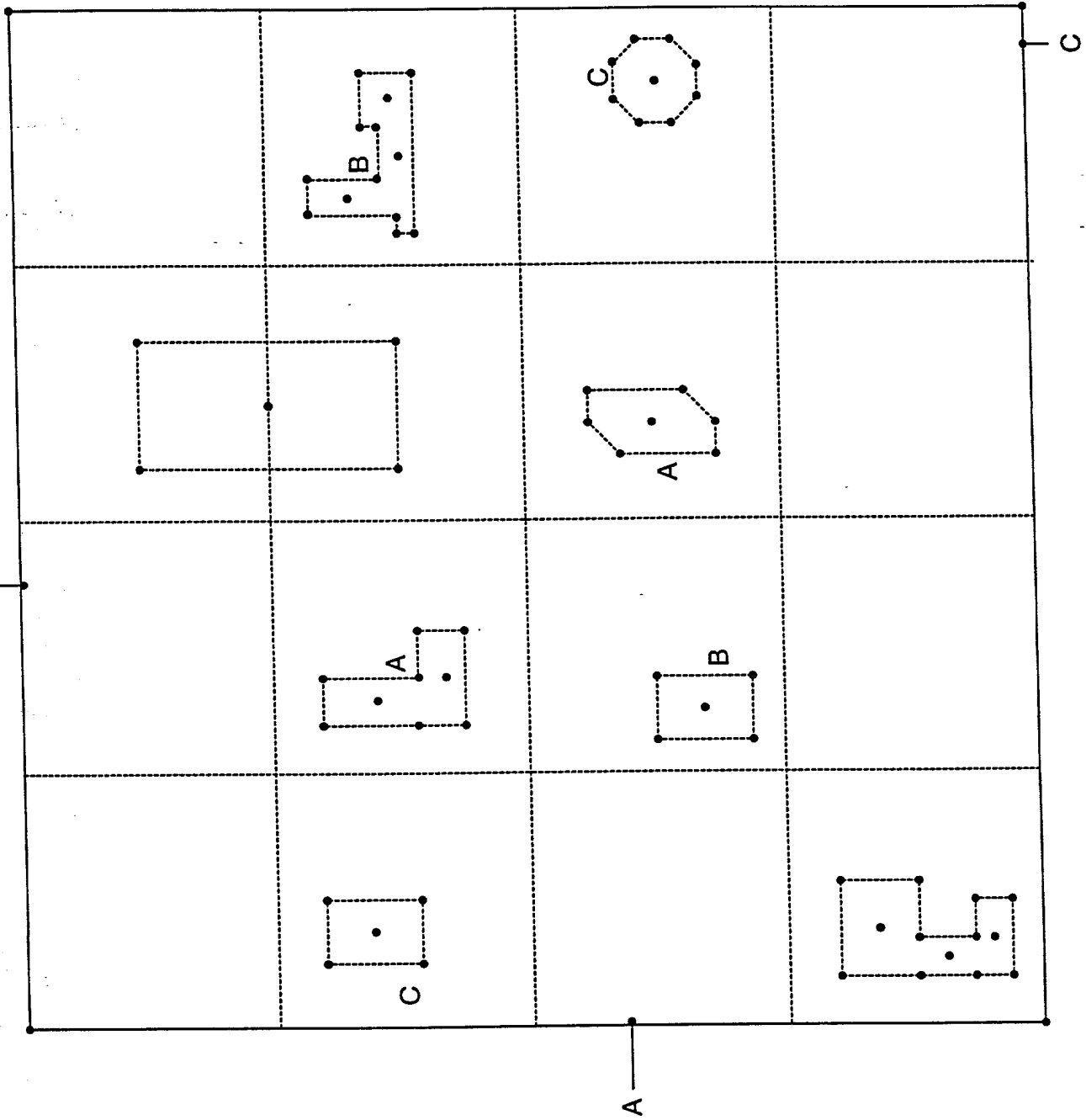


Figure 17

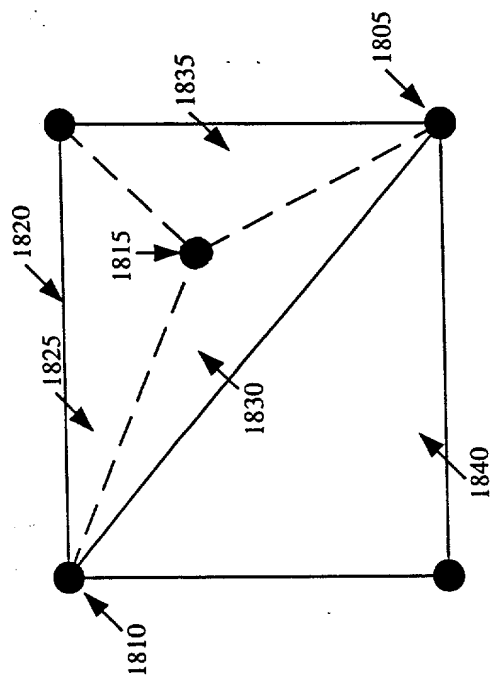


Figure 18

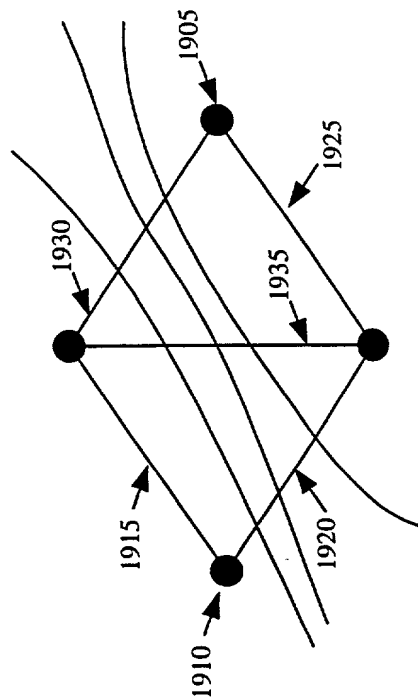


Figure 19

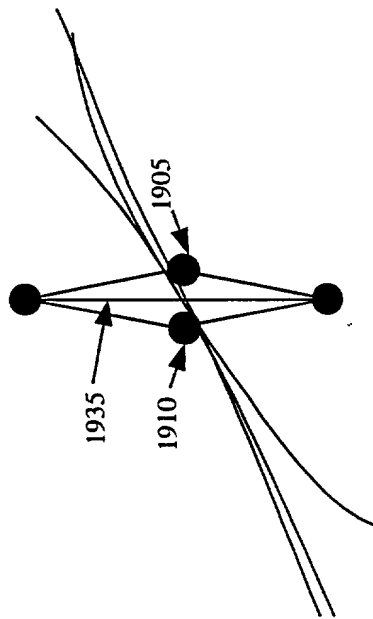


Figure 20

Figure 21

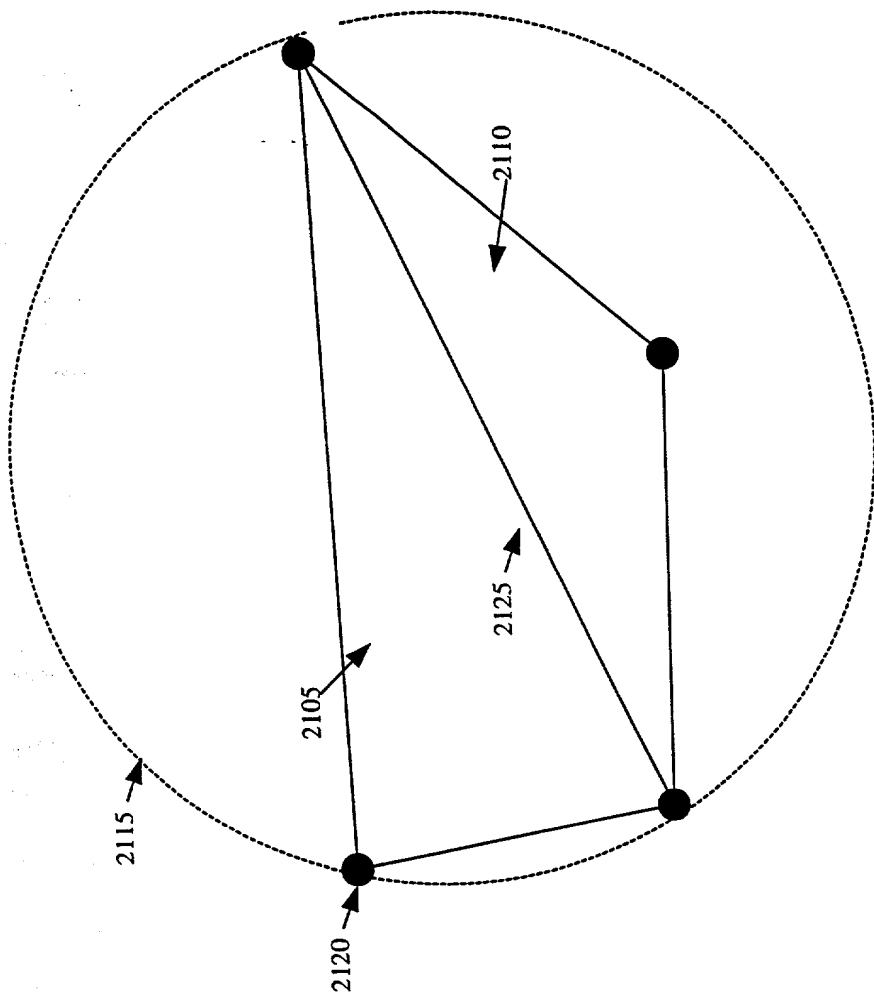
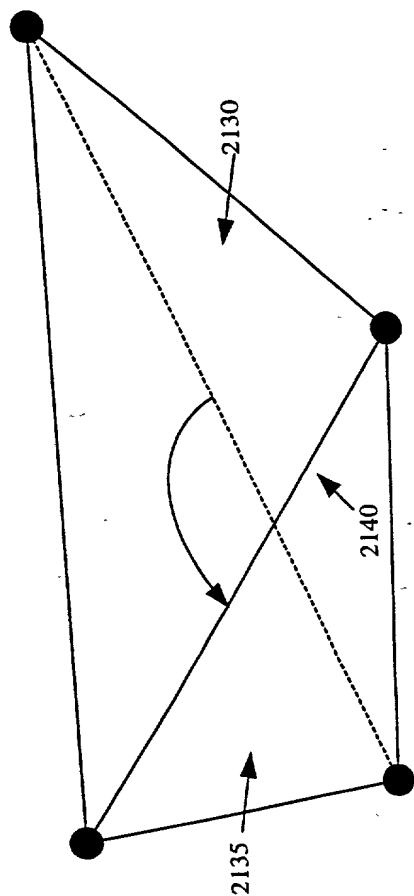


Figure 22



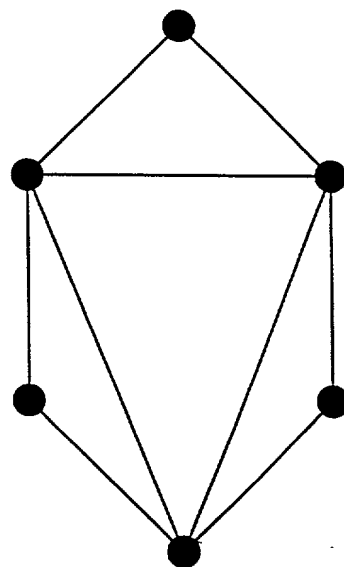
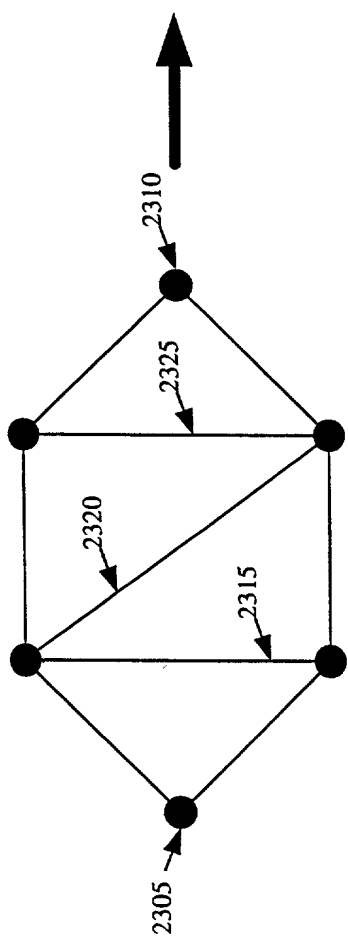
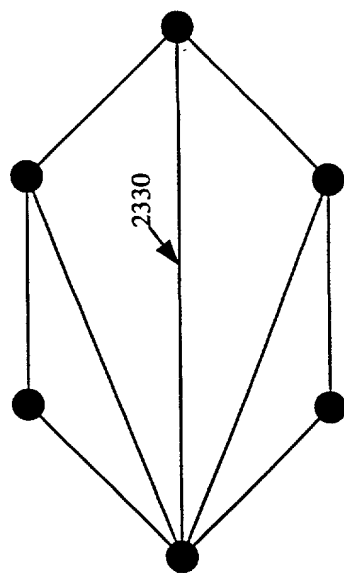
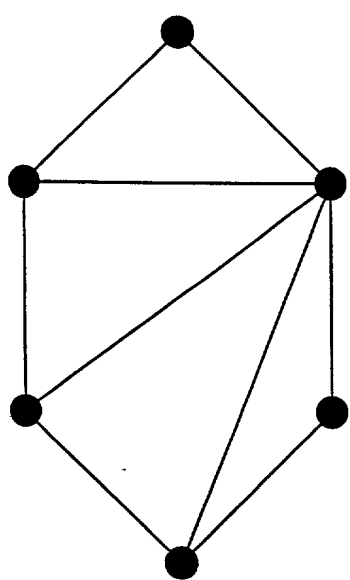


Figure 23

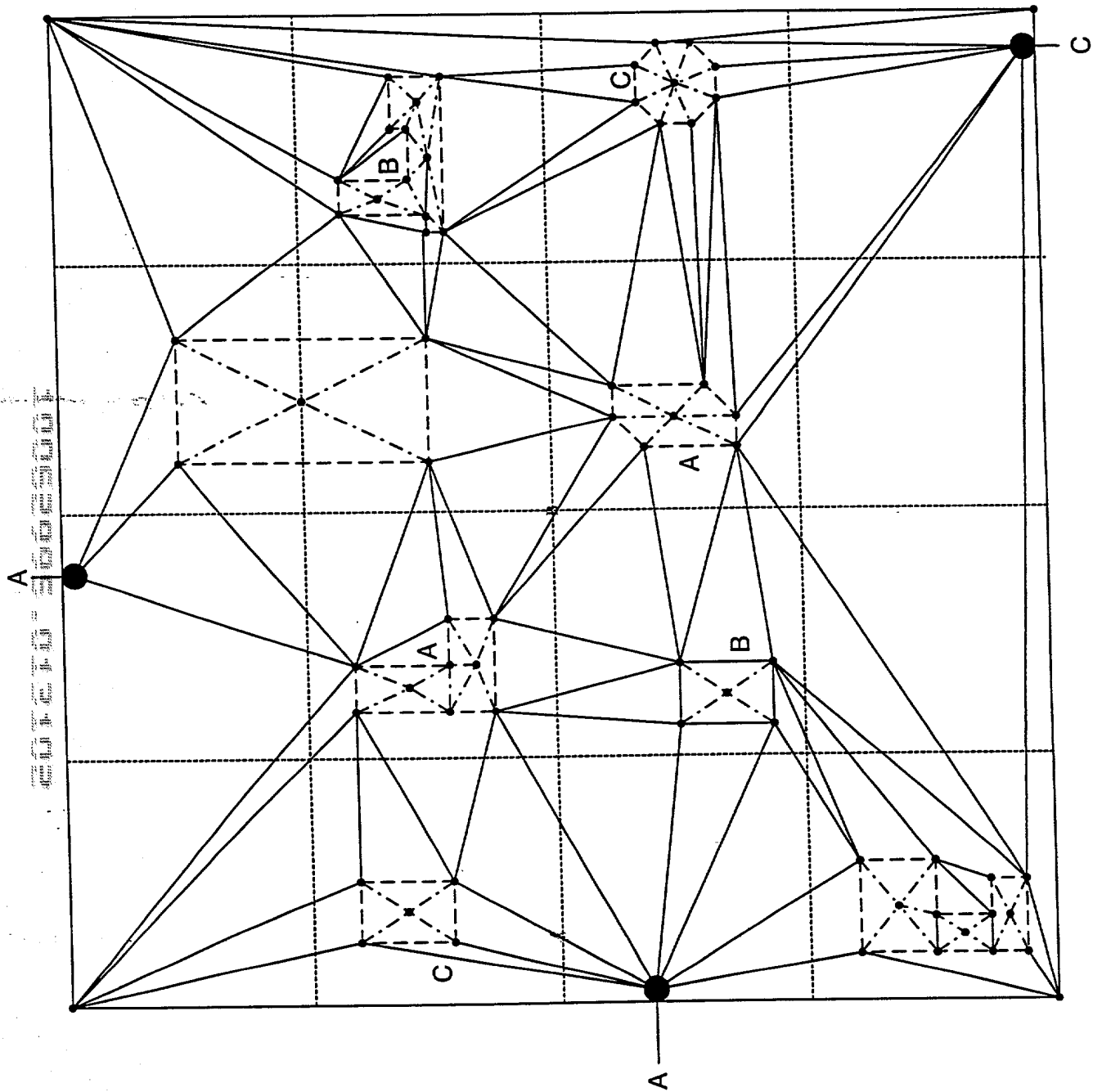


Figure 24

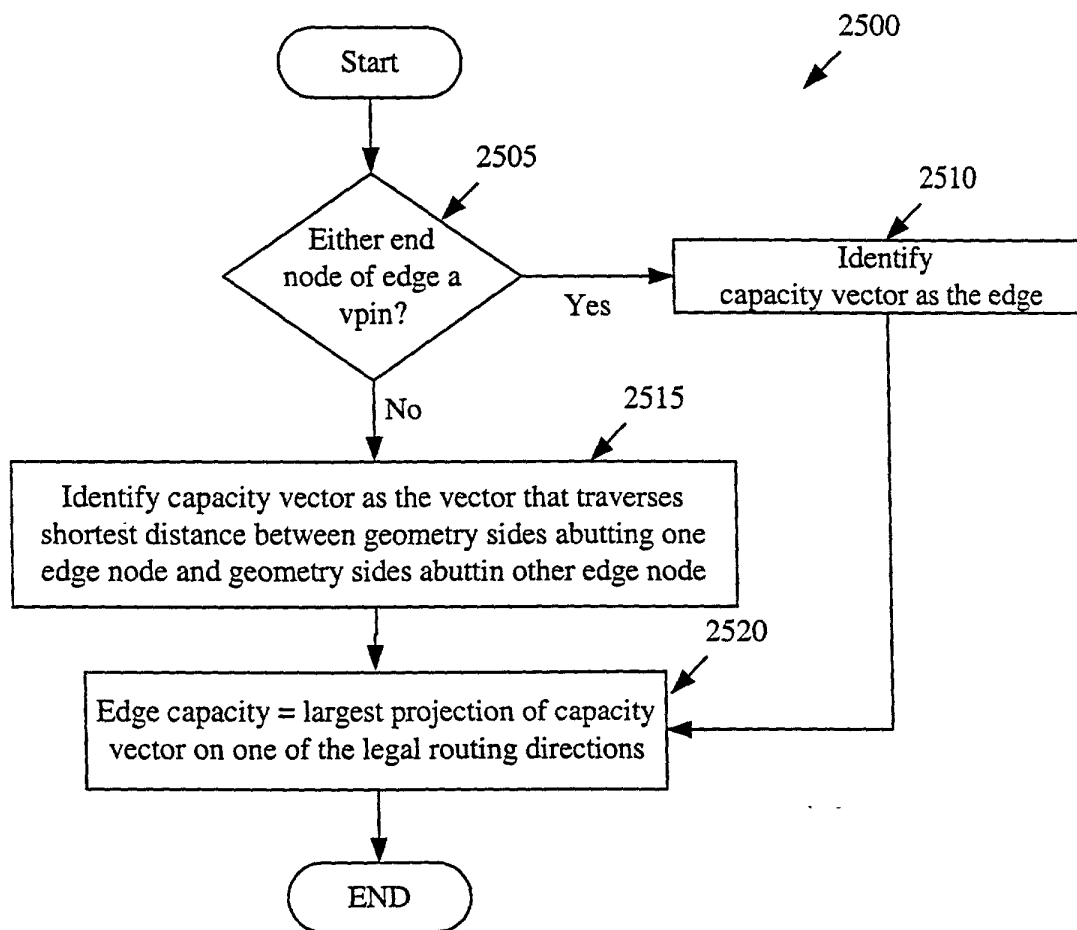


Figure 25

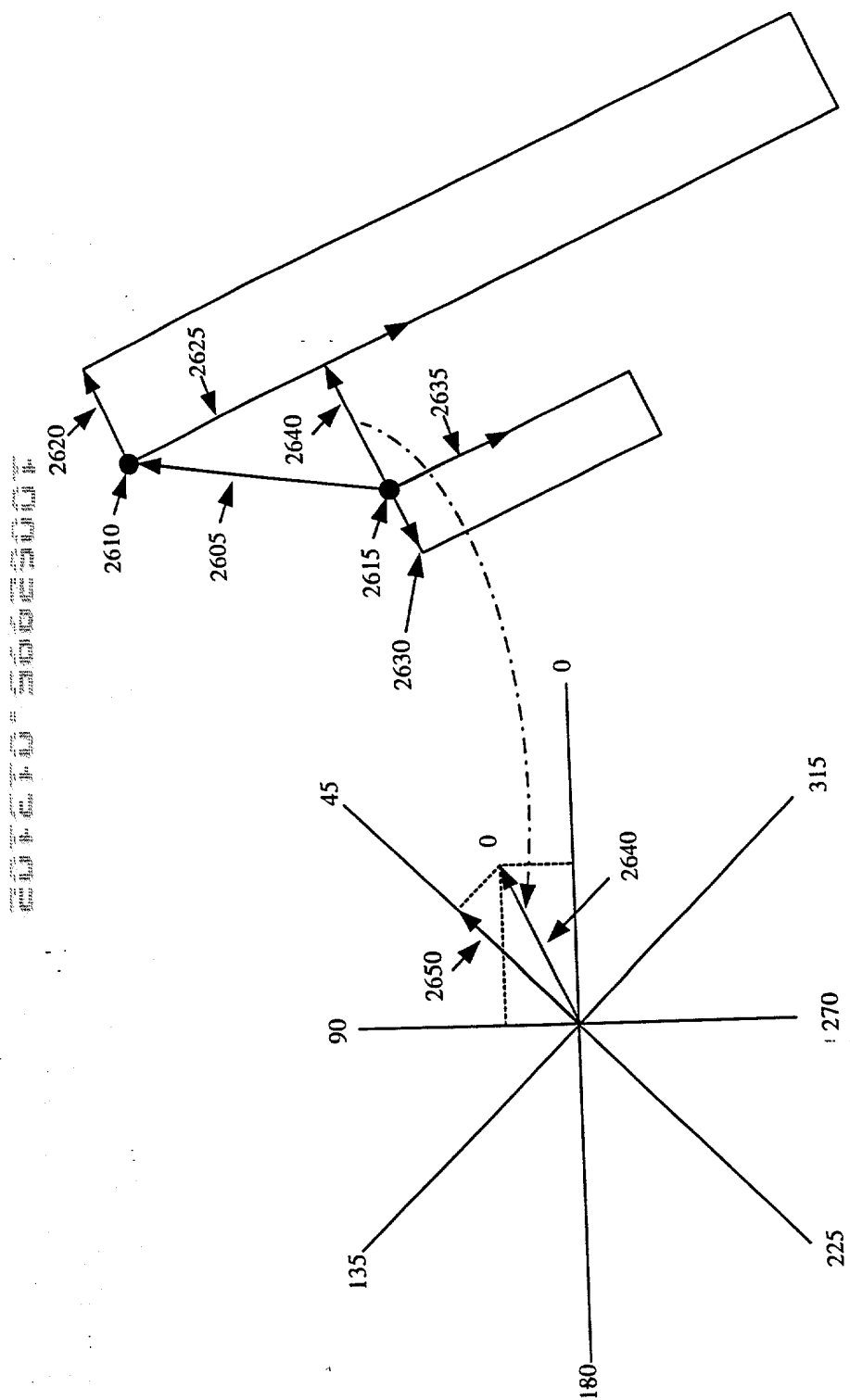


Figure 26

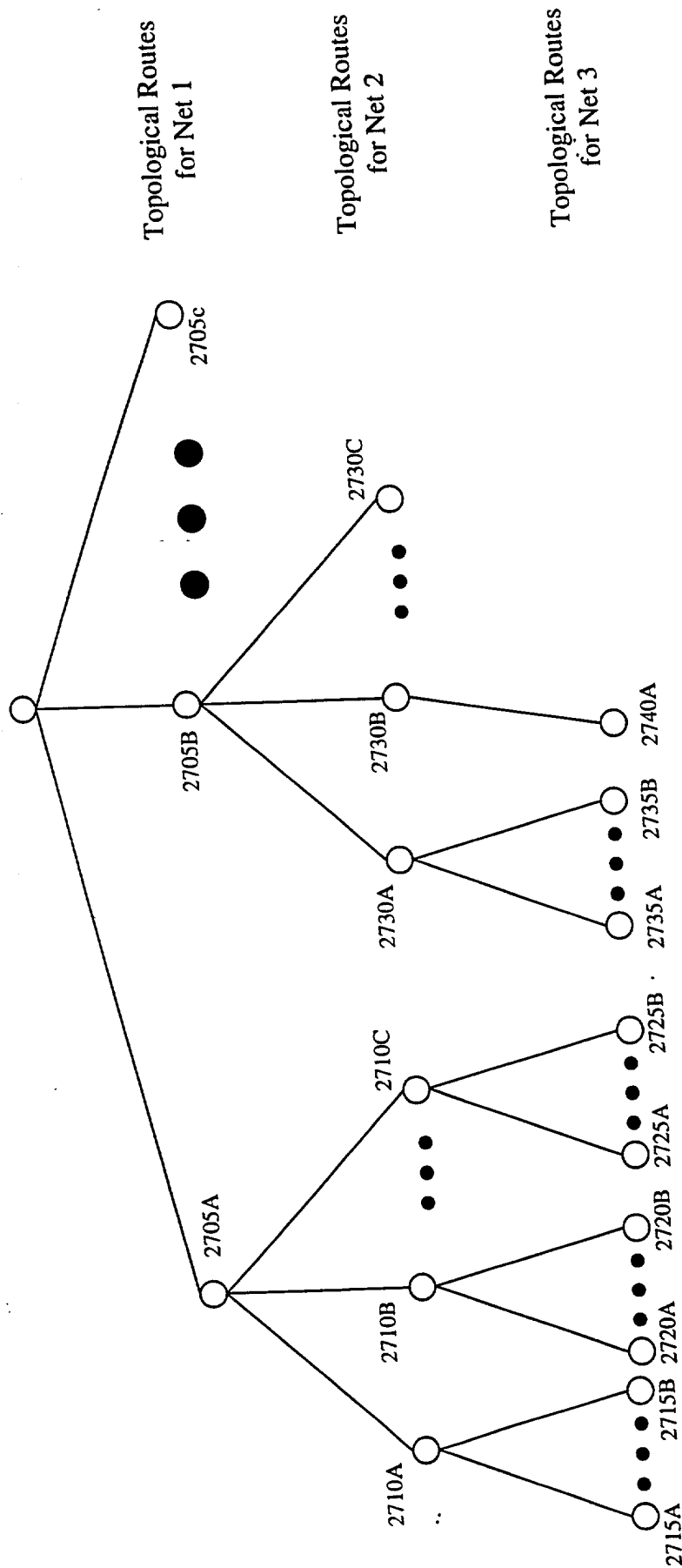


Figure 27

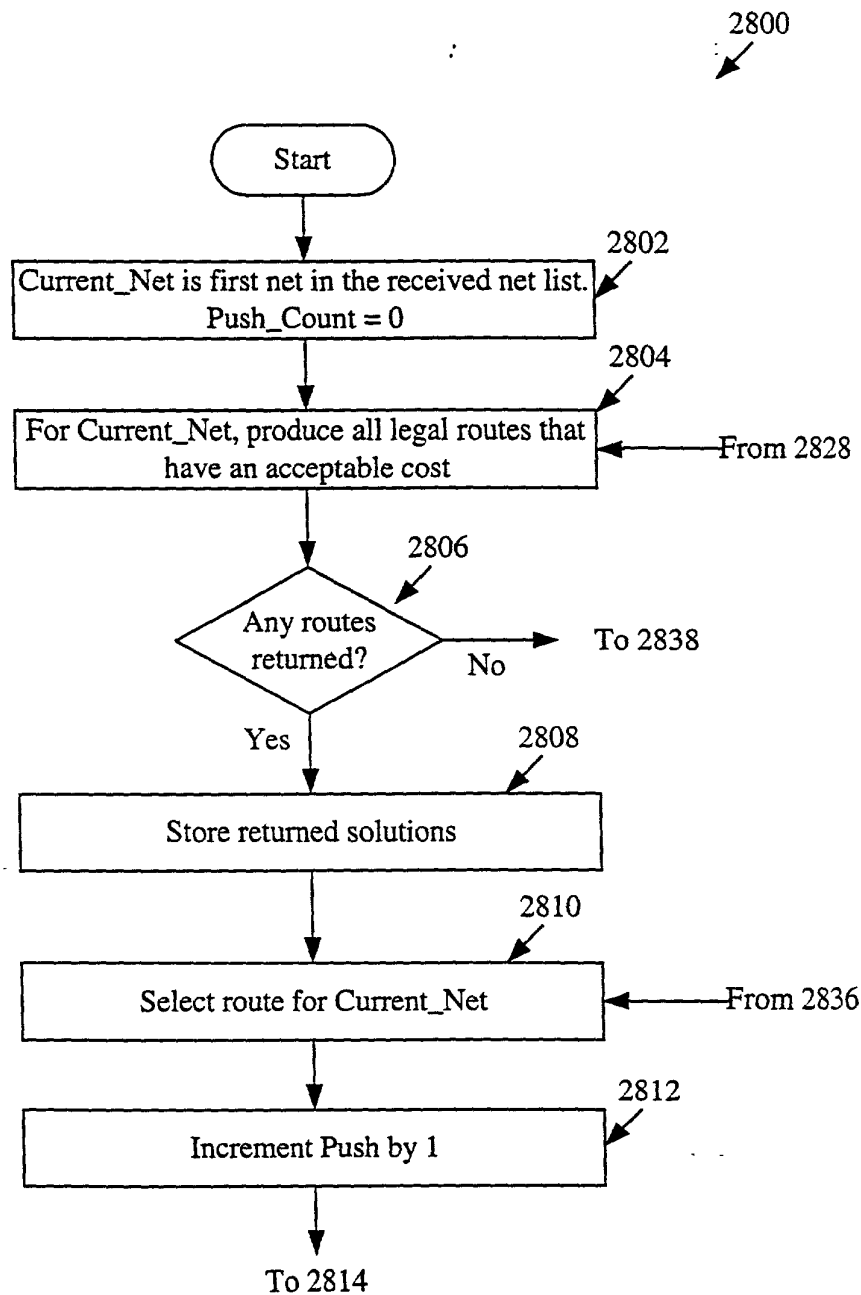


Figure 28A

Figure 28: $\frac{\text{Figure 28A}}{\text{Figure 28B} + \text{Figure 28C}}$

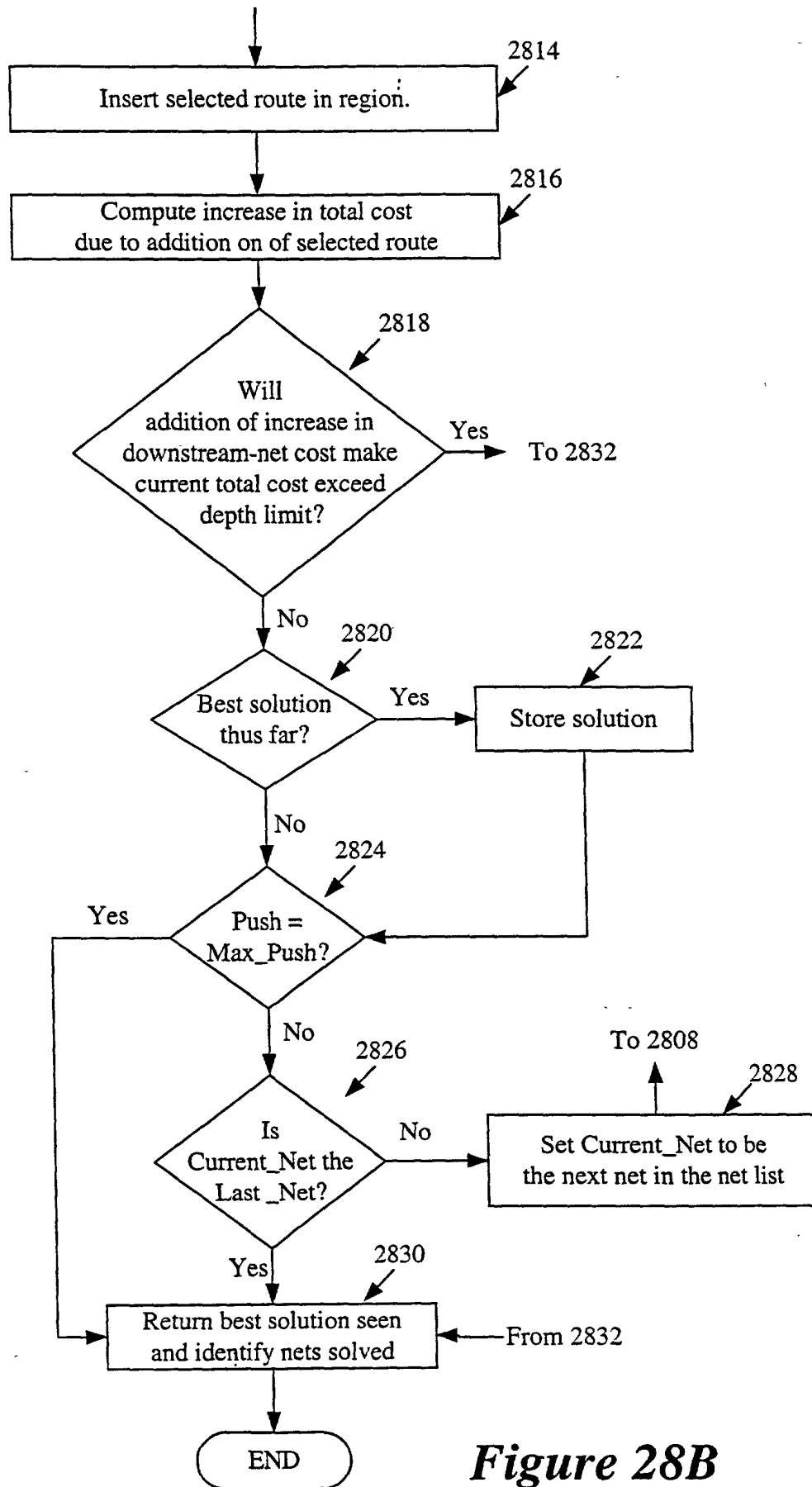


Figure 28B

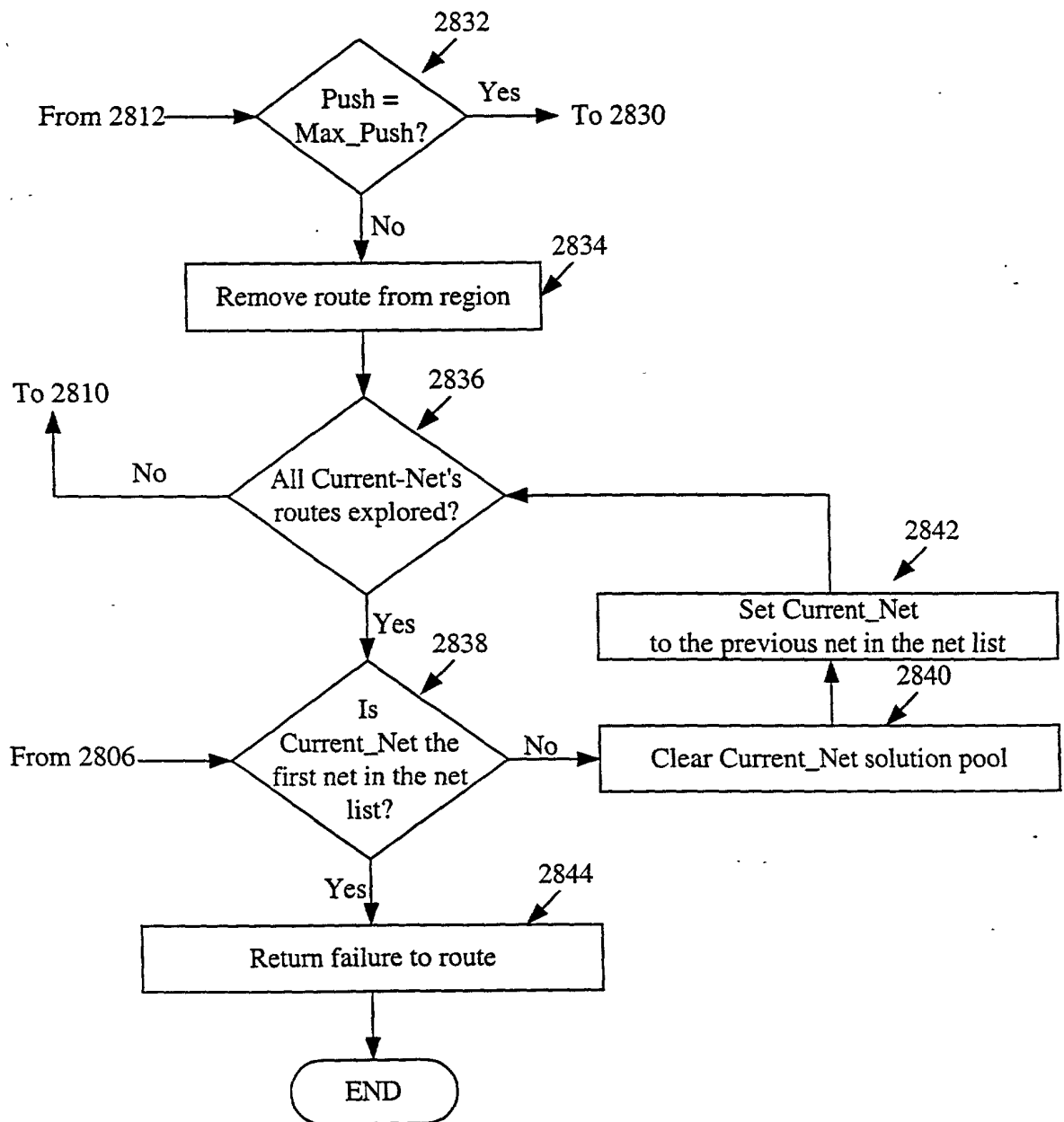


Figure 28C

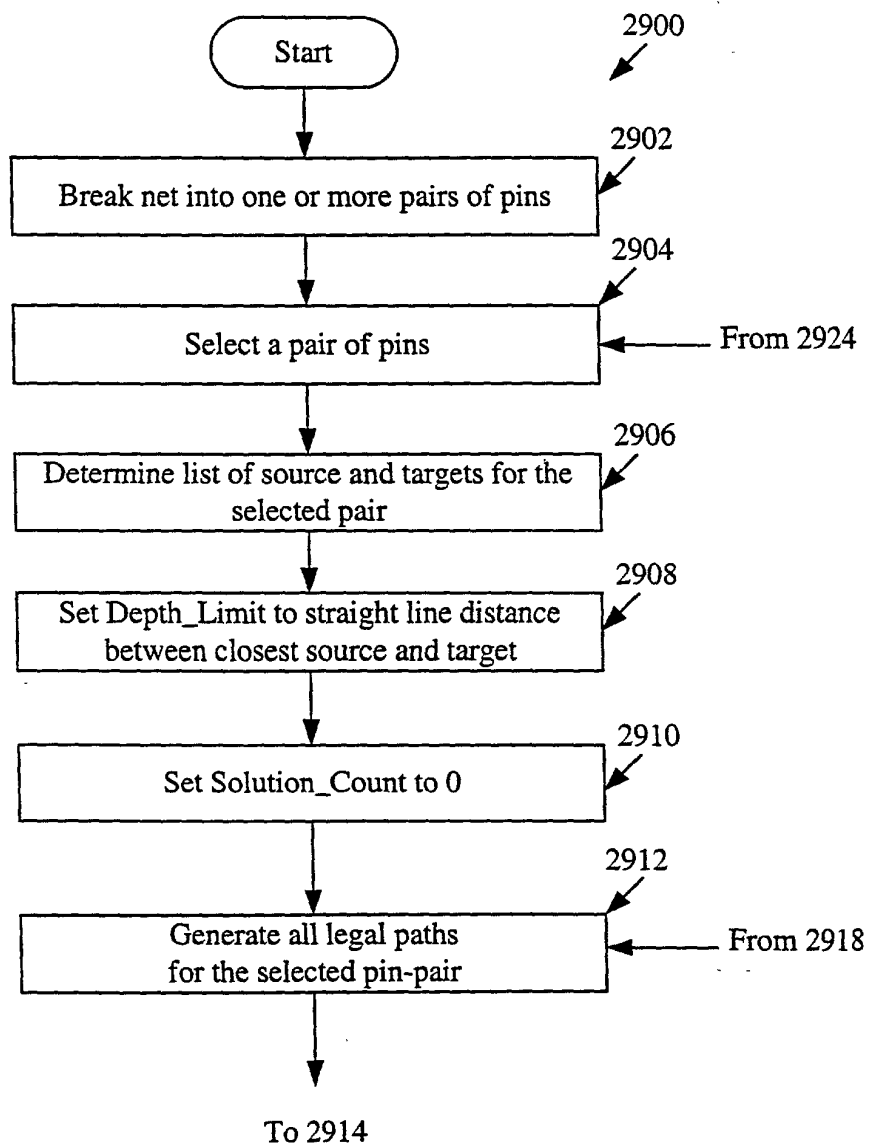


Figure 29A

Figure 29: $\frac{\text{Figure 29A}}{\text{Figure 29B}}$

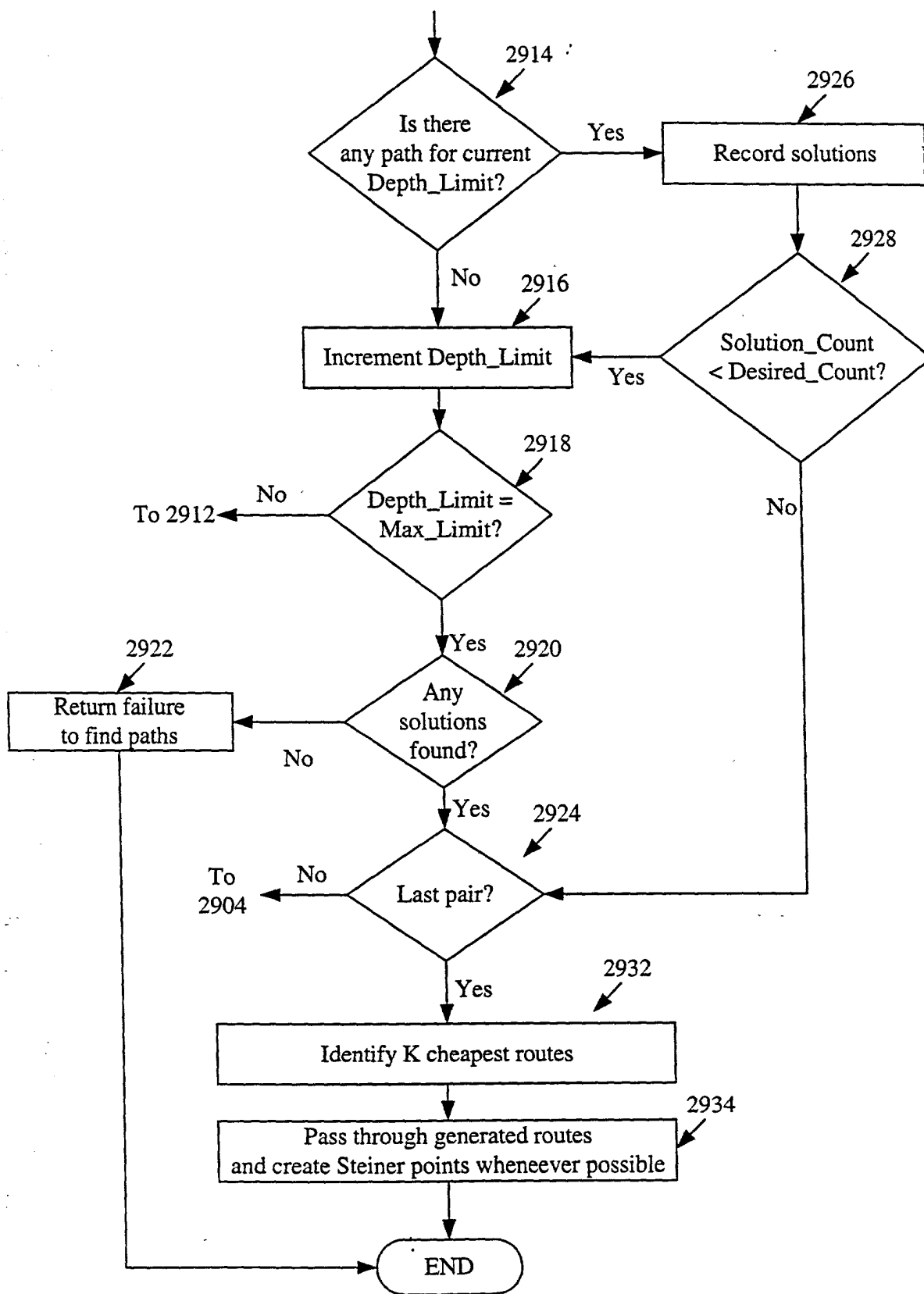


Figure 29B

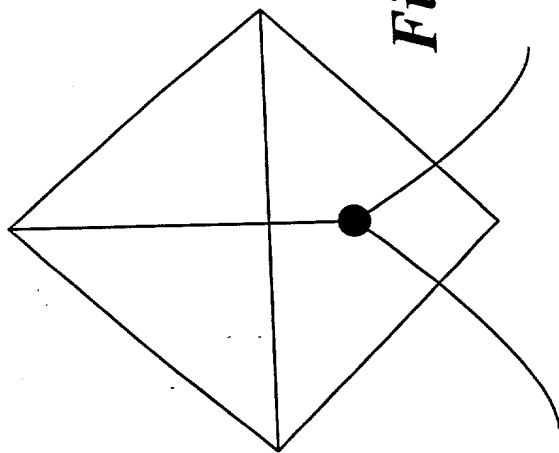


Figure 30B



Figure 30A

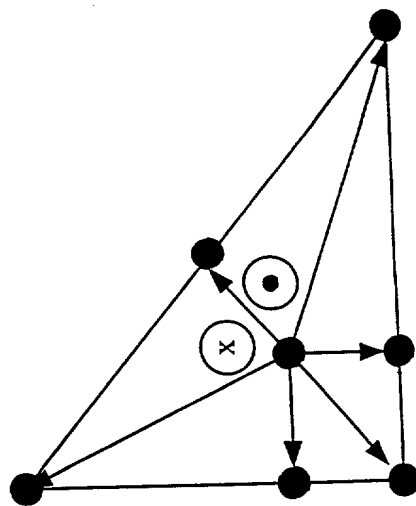


Figure 32

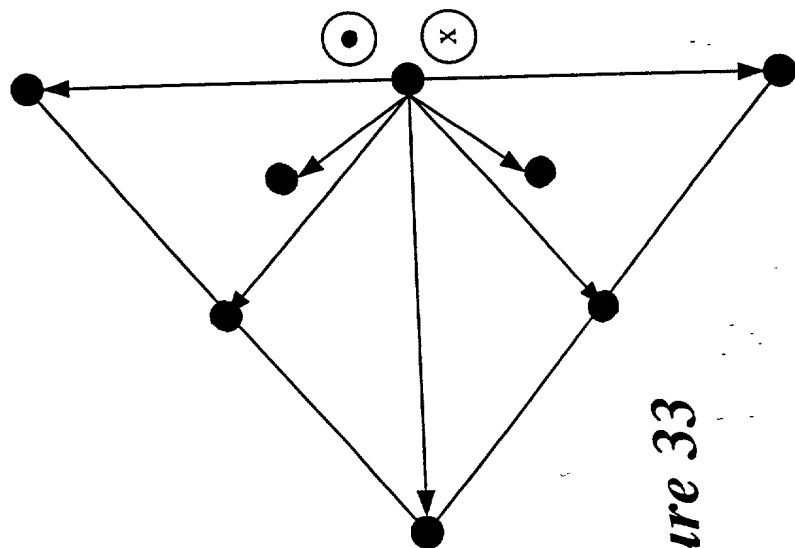


Figure 33

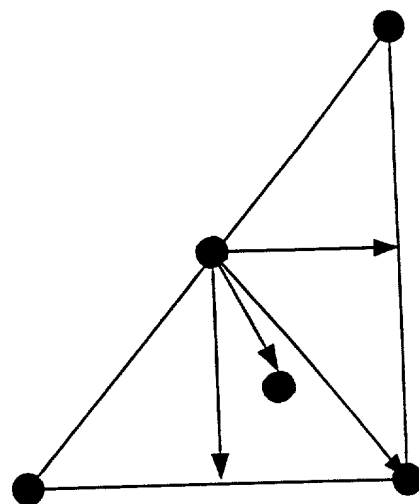


Figure 34

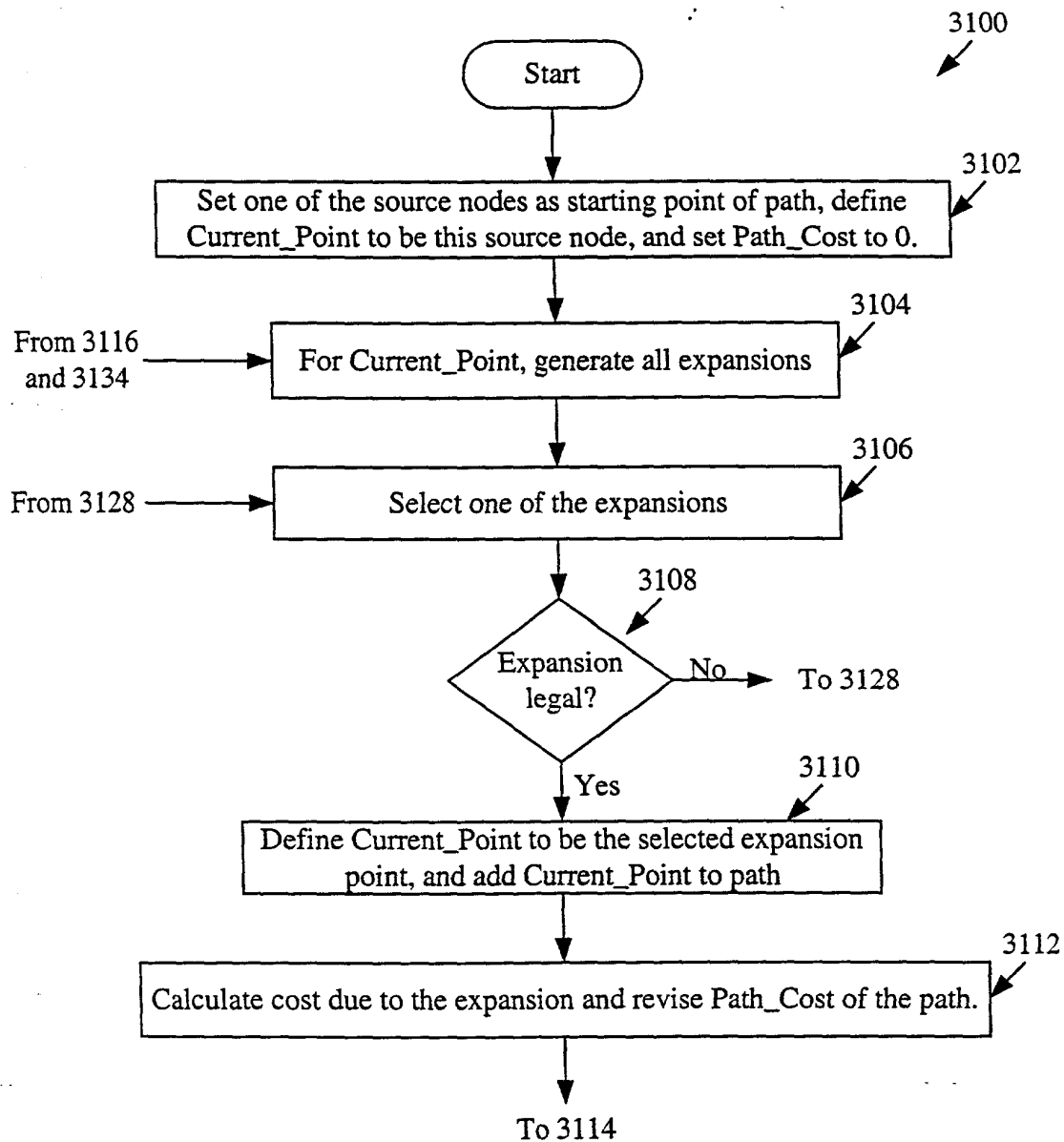


Figure 31A

Figure 31: $\frac{\text{Figure 31A}}{\text{Figure 31B}}$

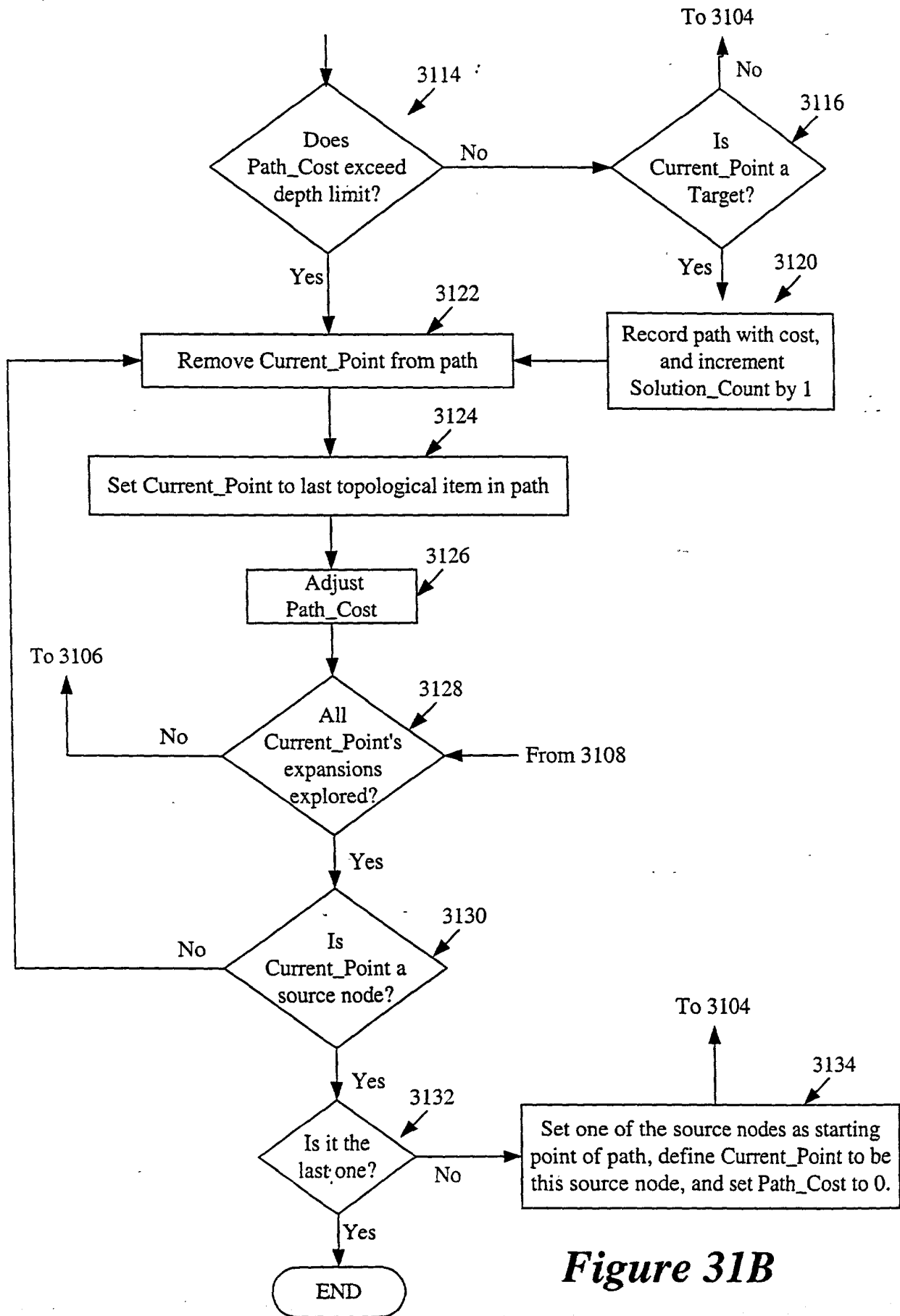


Figure 31B

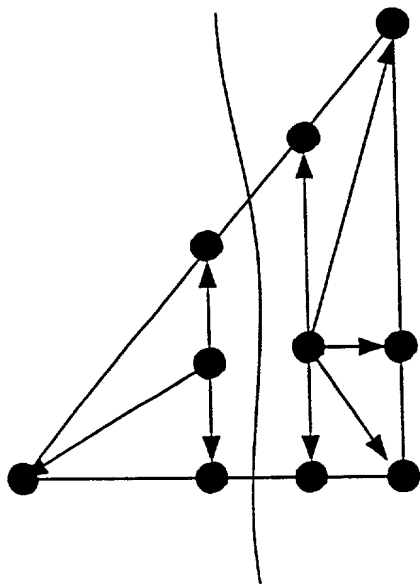


Figure 35

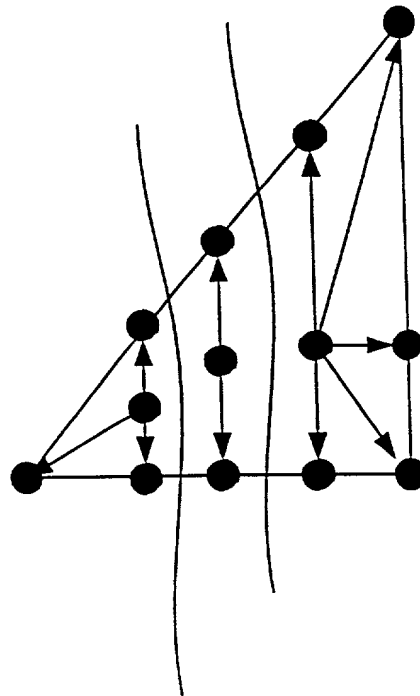


Figure 36

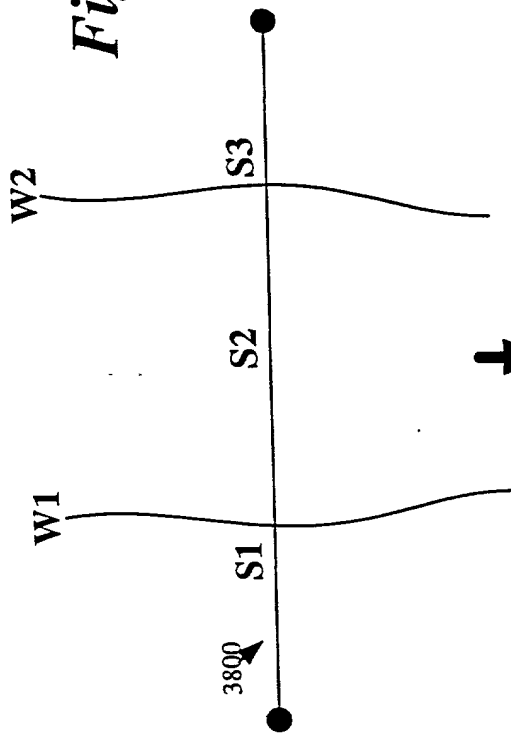


Figure 38A

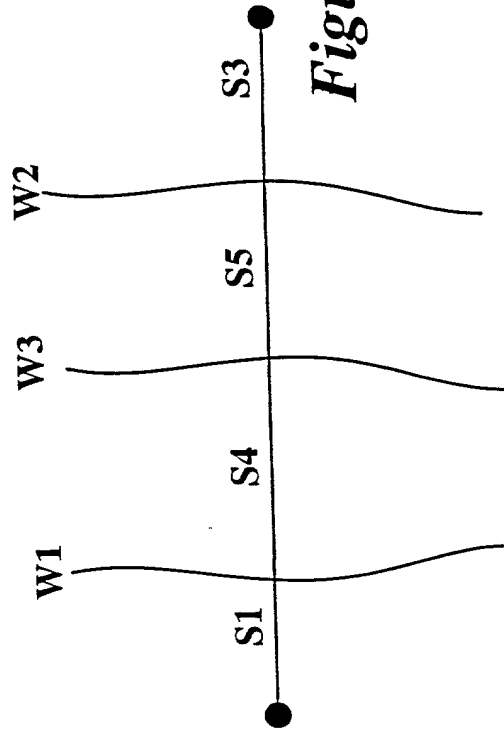


Figure 38B

To:		Node	Face Item	Edge Item
From:	Node	<ul style="list-style-type: none"> • Planarity • Vias 	<ul style="list-style-type: none"> • Vias 	<ul style="list-style-type: none"> • Planarity • Vias • Edge • Capacity
	Face Item	<ul style="list-style-type: none"> • Vias 	<ul style="list-style-type: none"> • Vias 	<ul style="list-style-type: none"> • Vias • Edge • Capacity
	Edge Item	<ul style="list-style-type: none"> • Planarity • Vias 	<ul style="list-style-type: none"> • Vias 	<ul style="list-style-type: none"> • Planarity • Vias • Edge • Capacity

Figure 37

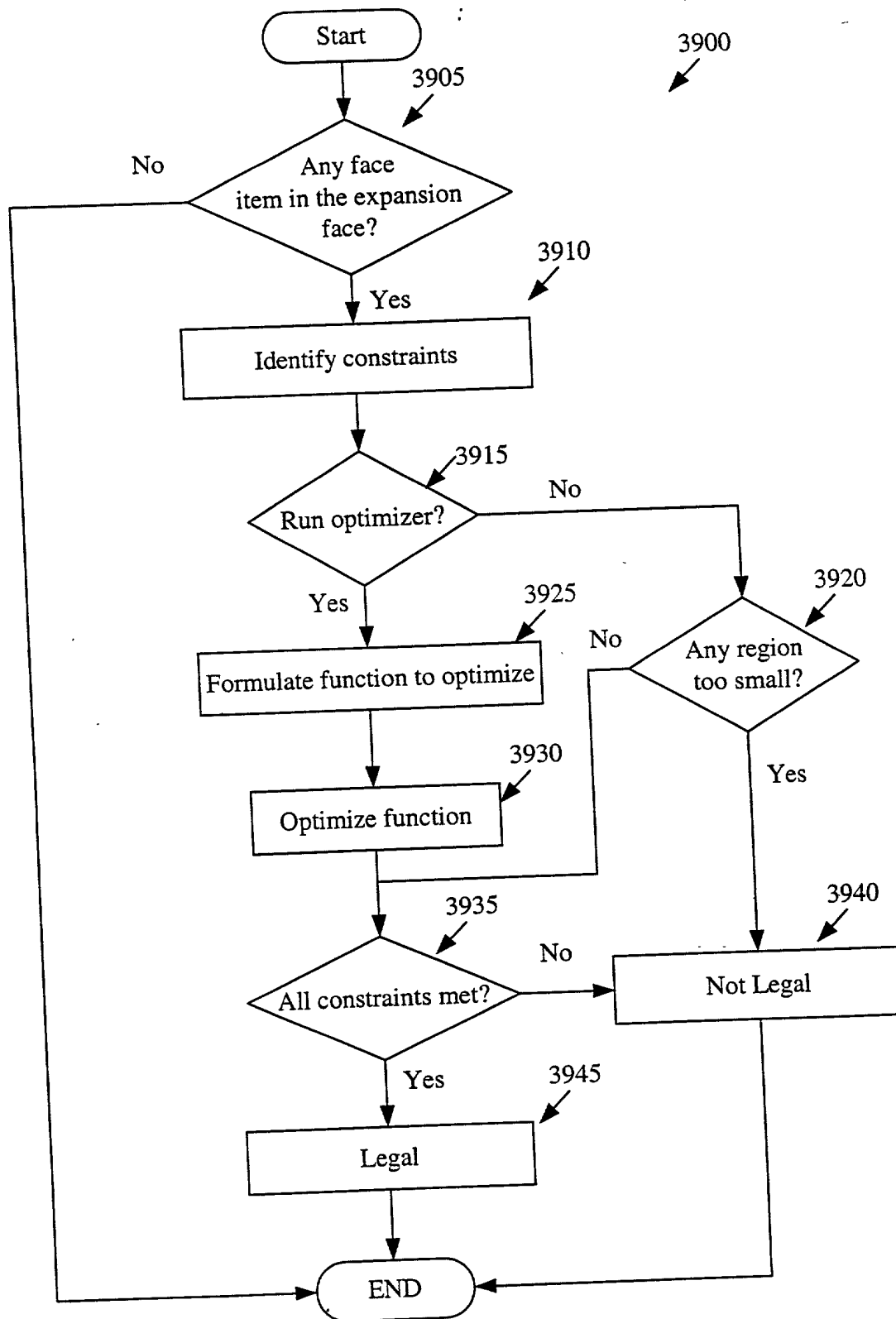


Figure 39A

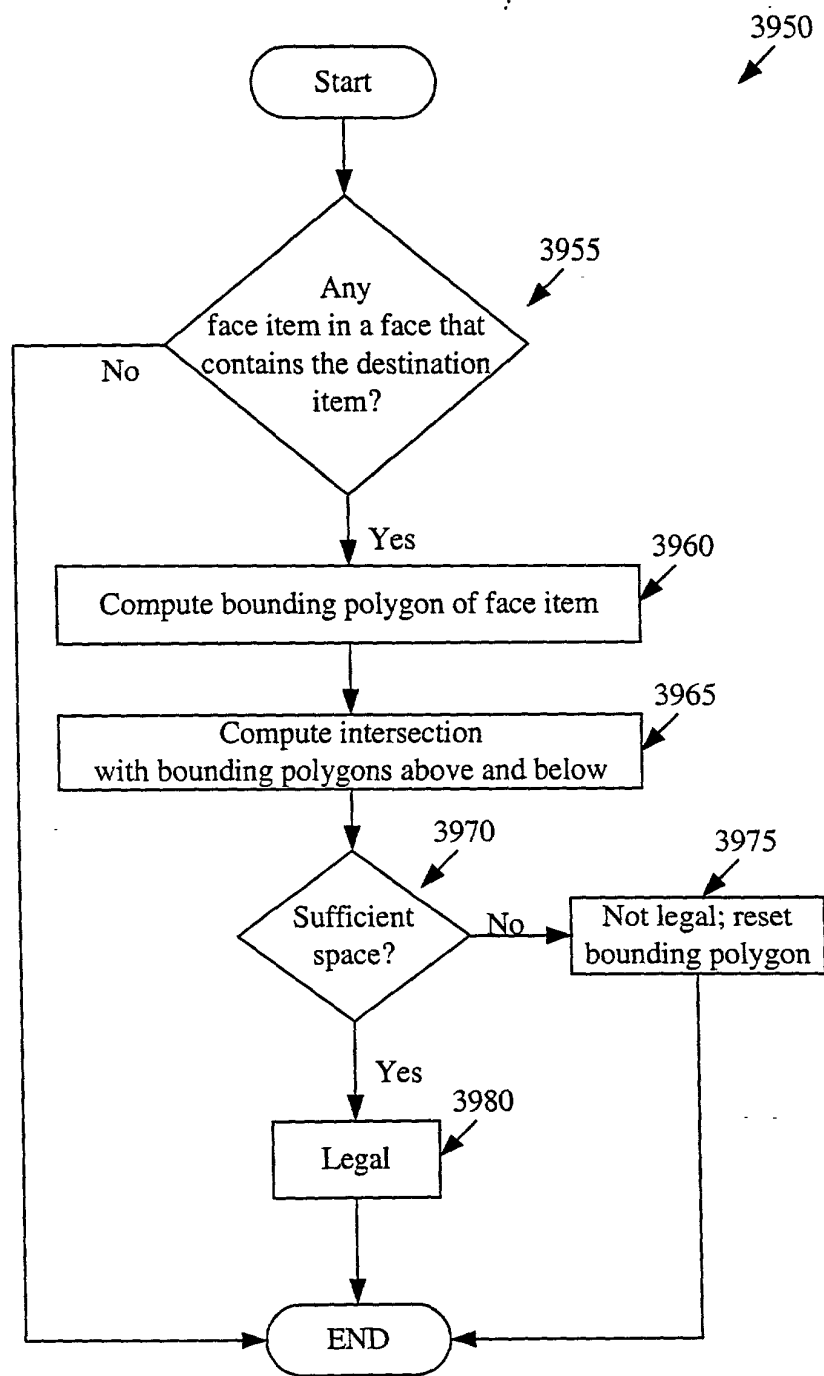


Figure 39B

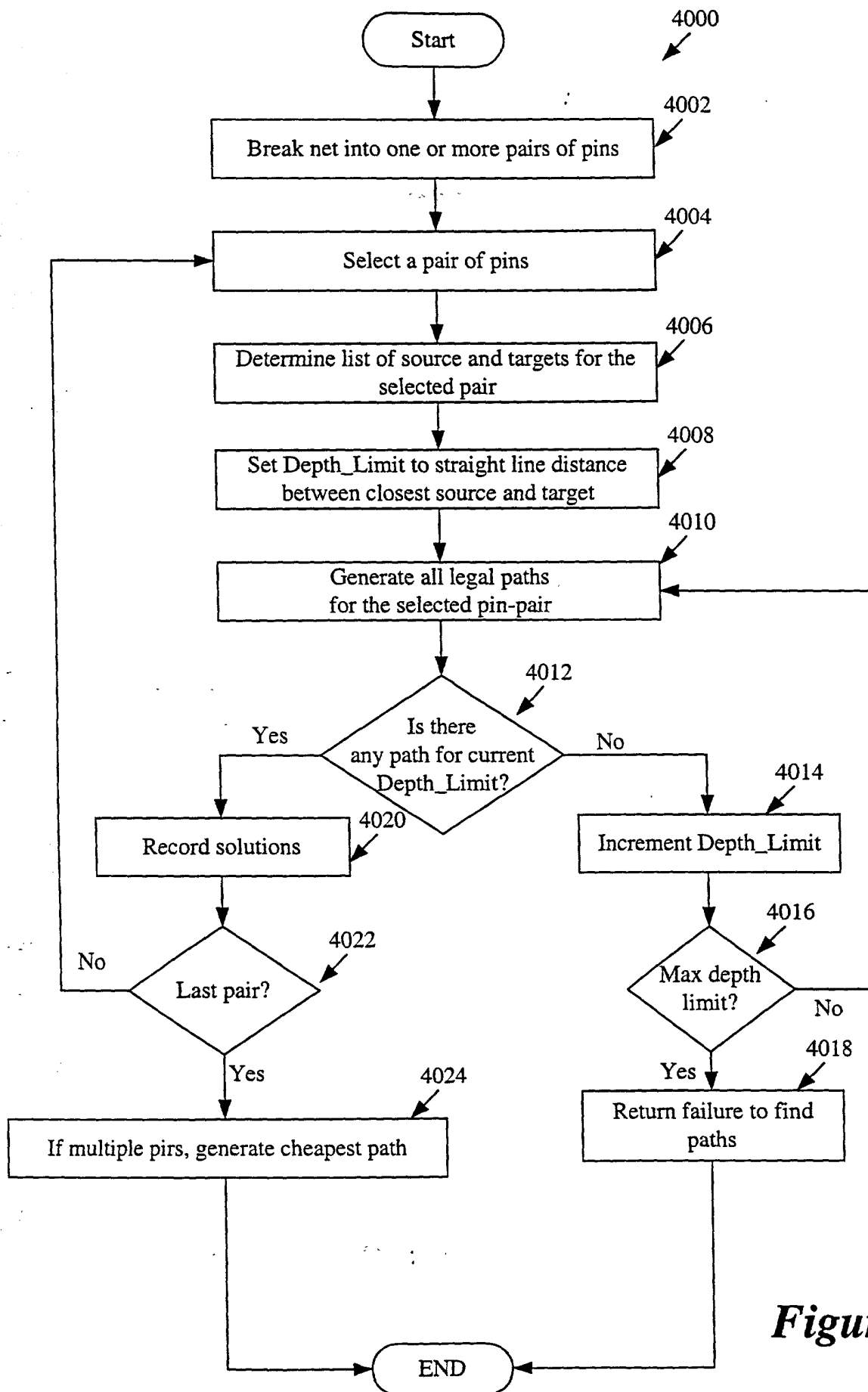


Figure 40

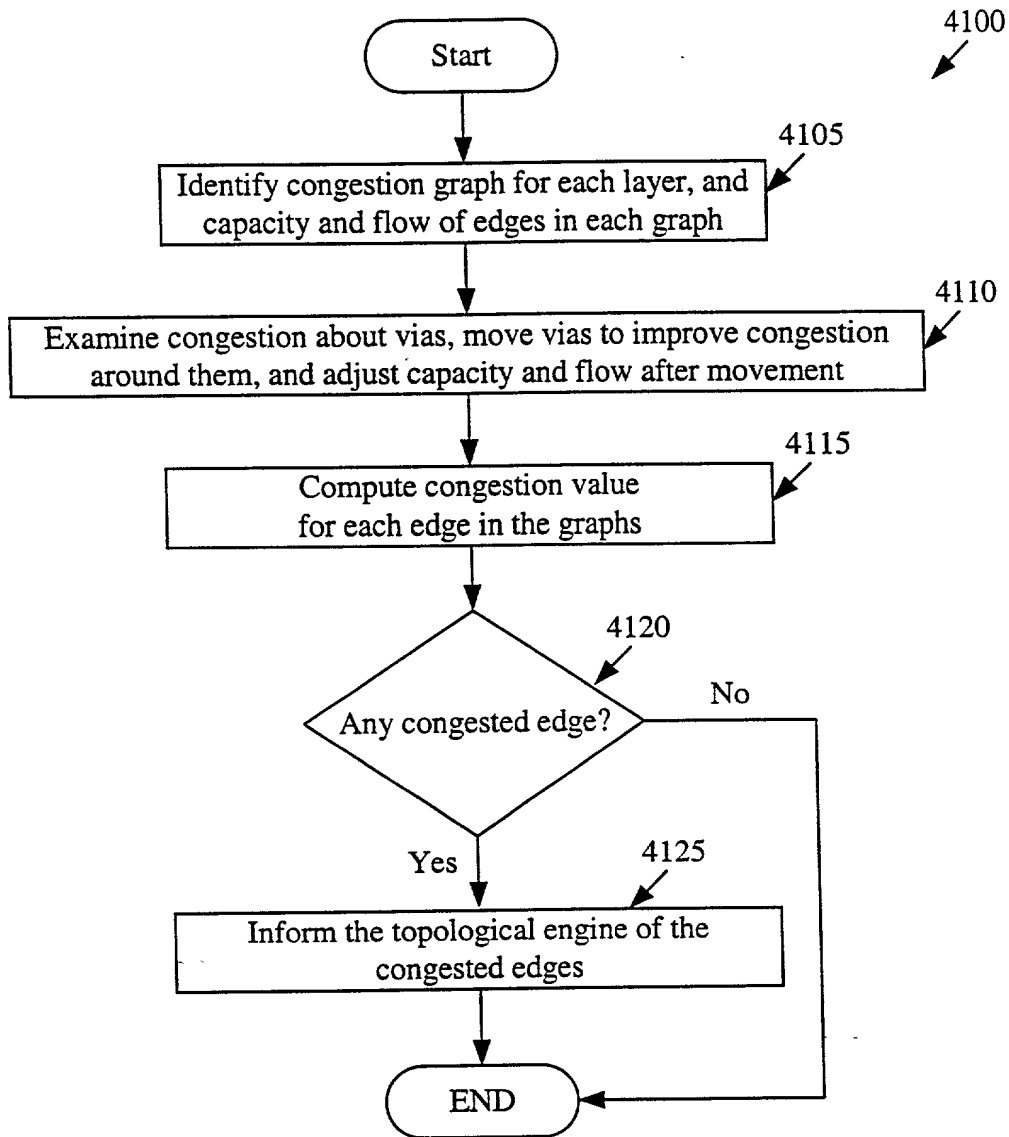


Figure 41

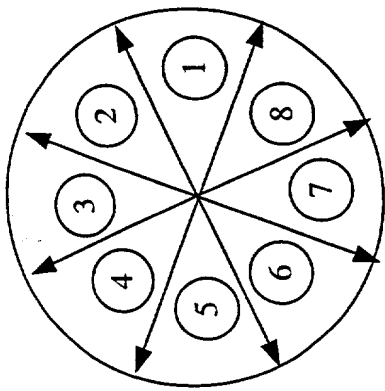


Figure 42

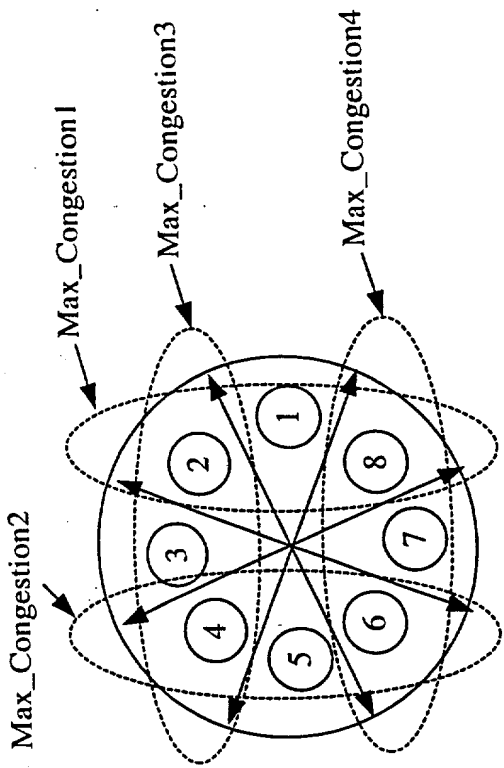


Figure 44

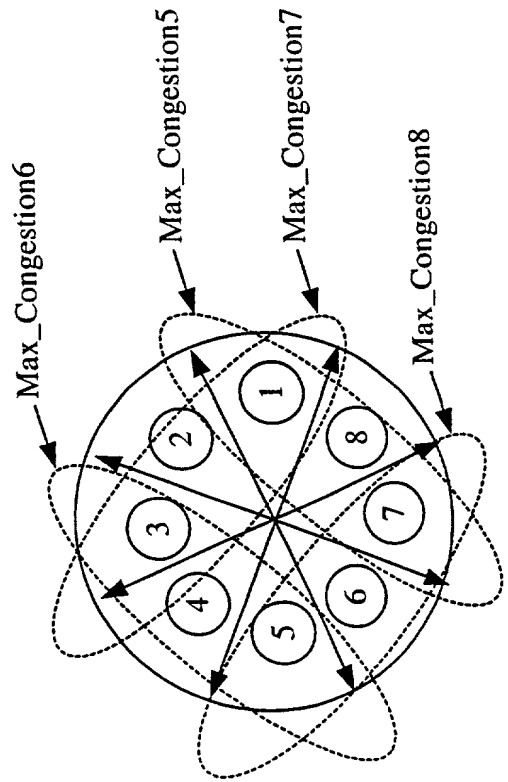


Figure 45

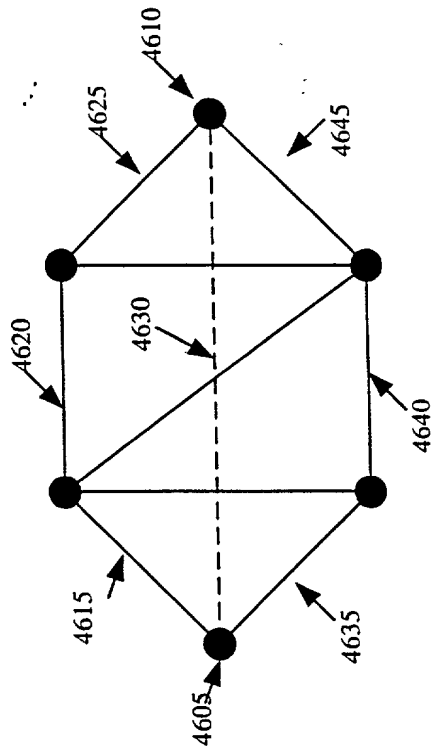


Figure 46

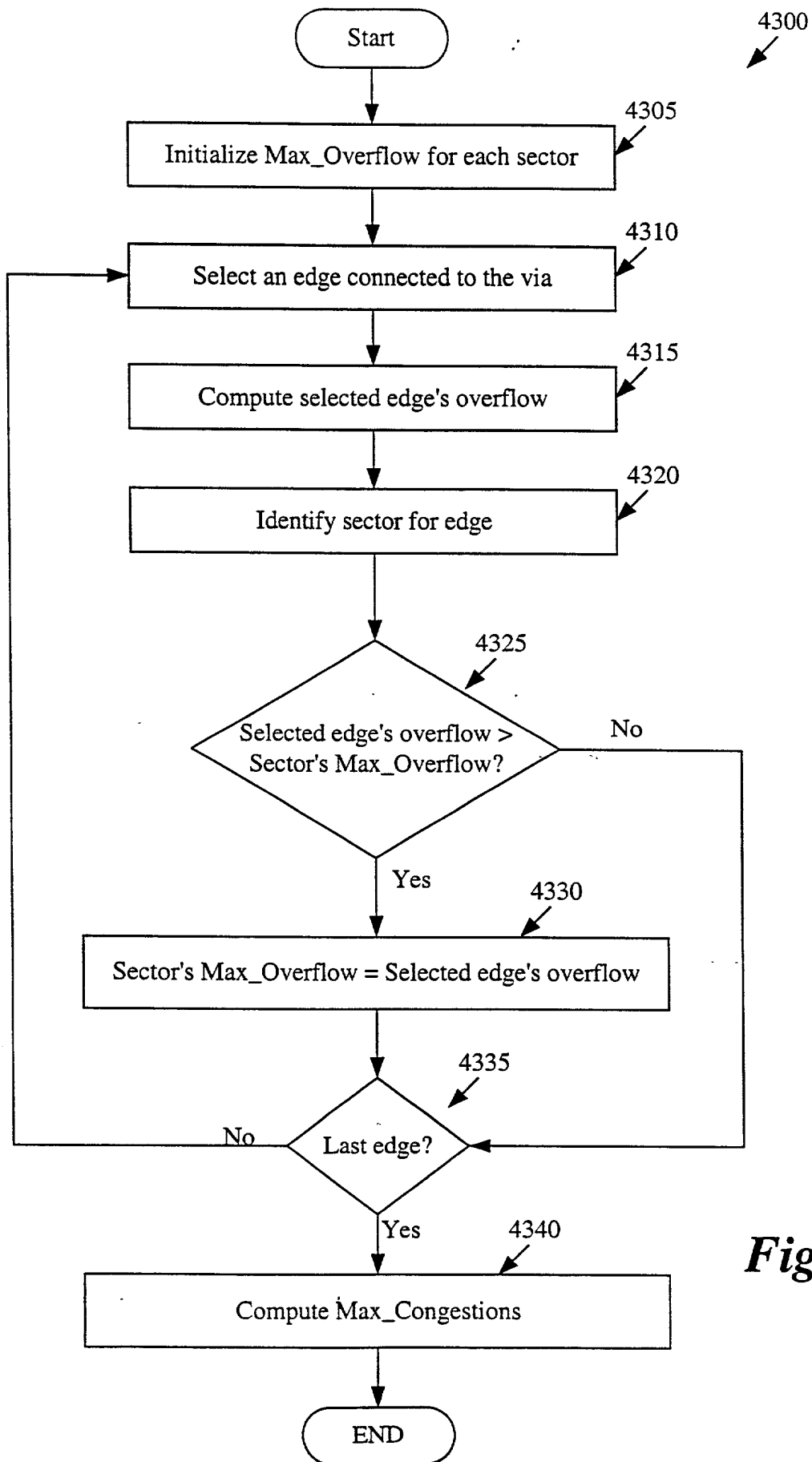


Figure 43

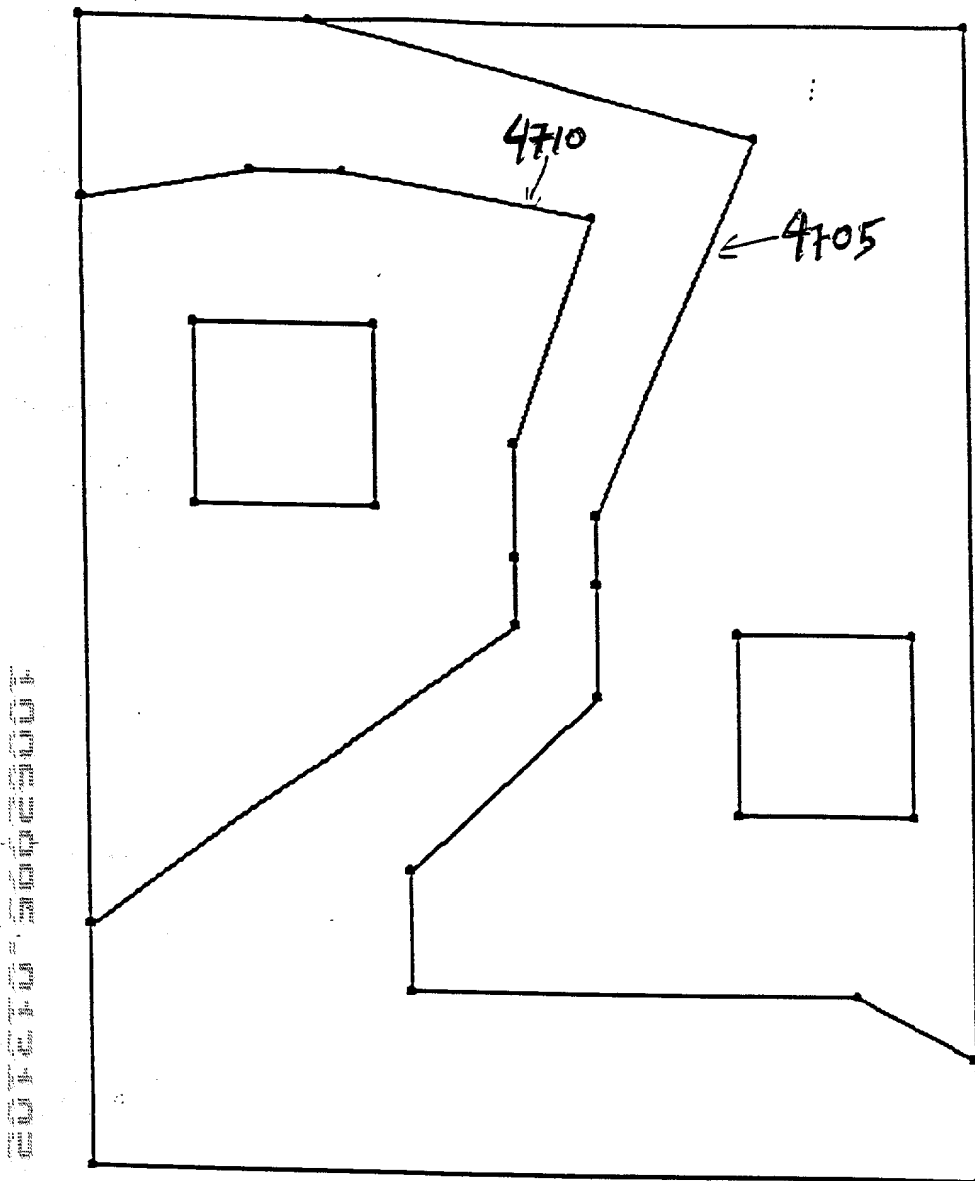


FIGURE 47

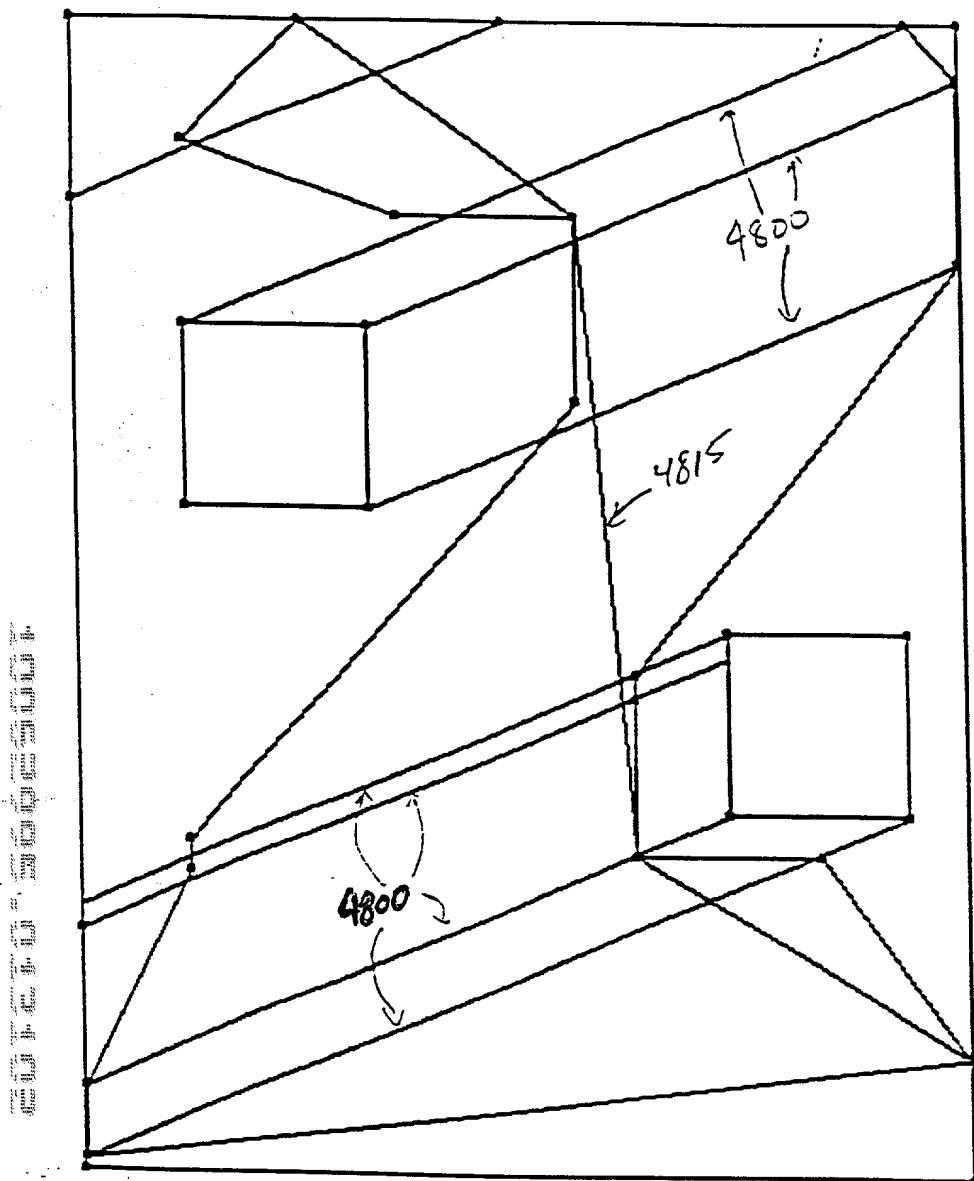


FIGURE 48A

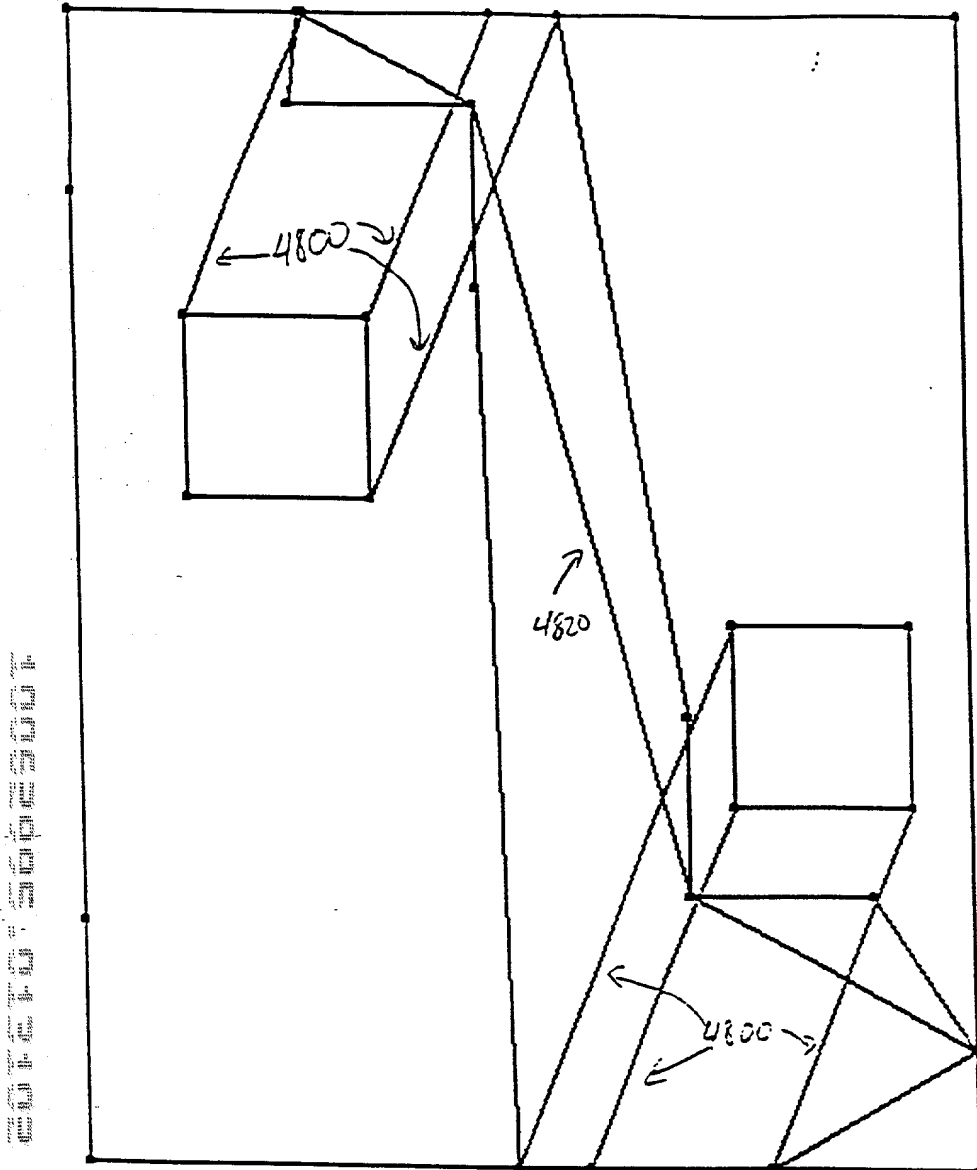


FIGURE 48B

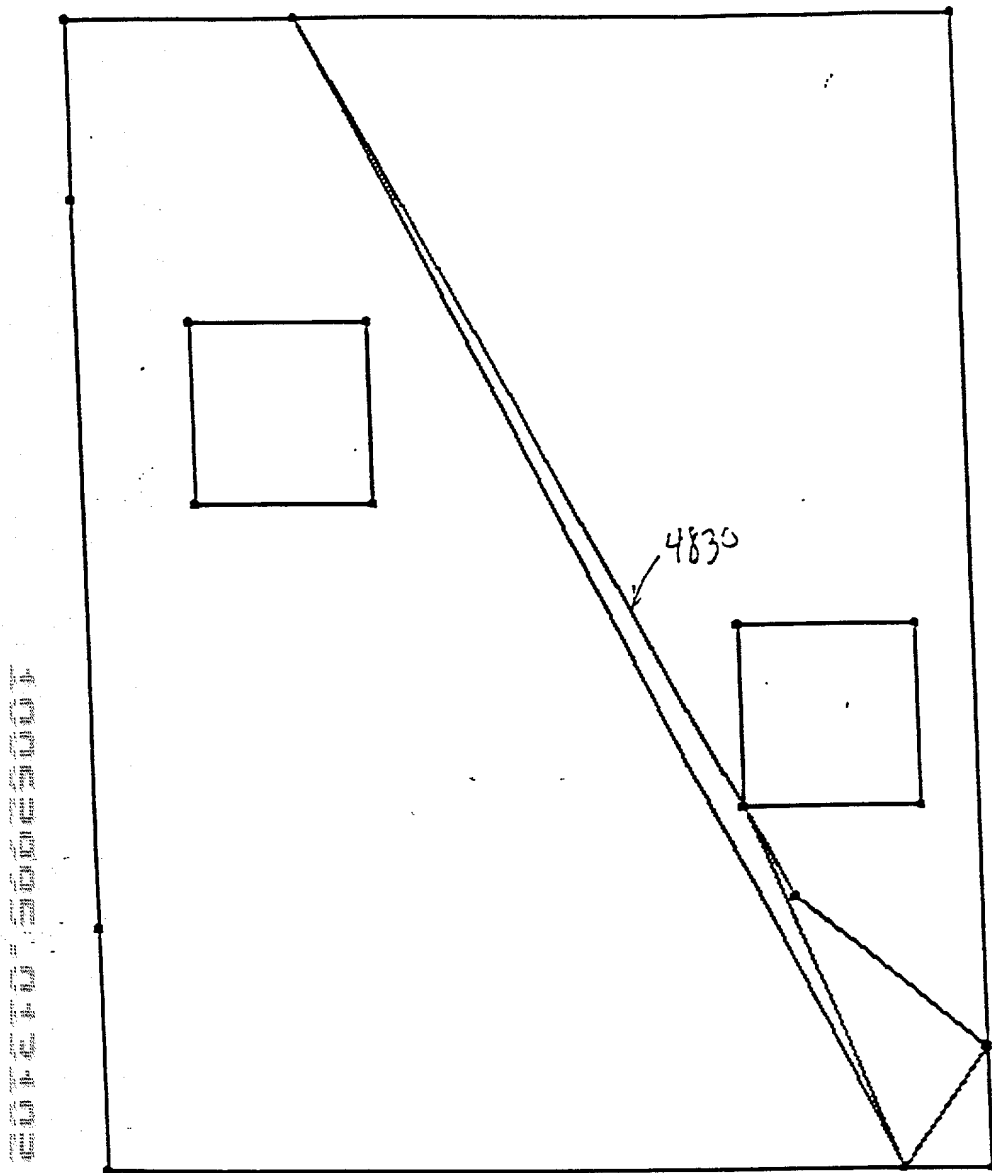


FIGURE 48D



Figure 49A

Figure 49B

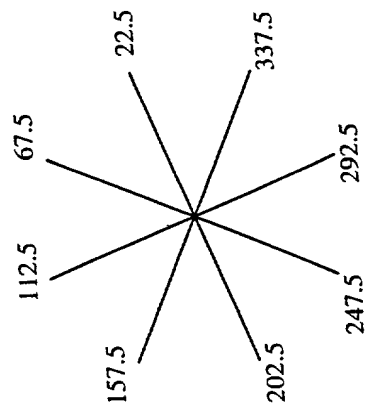


Figure 49C

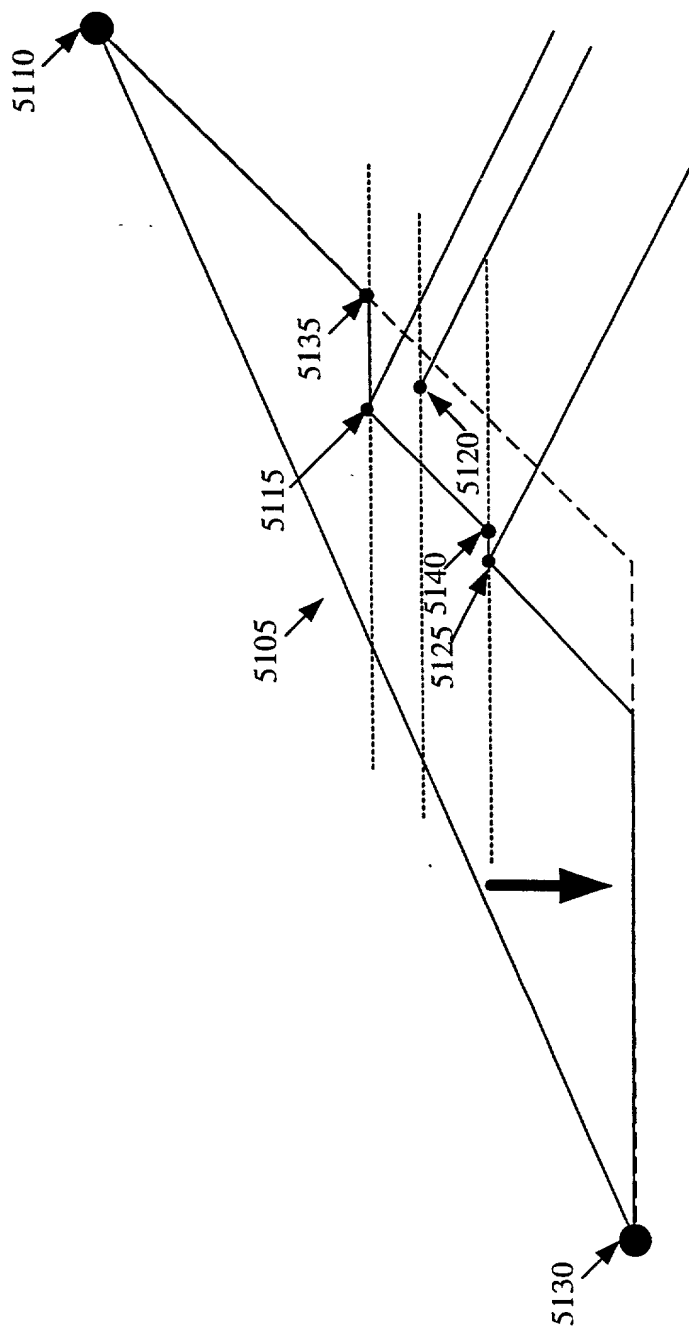


Figure 51

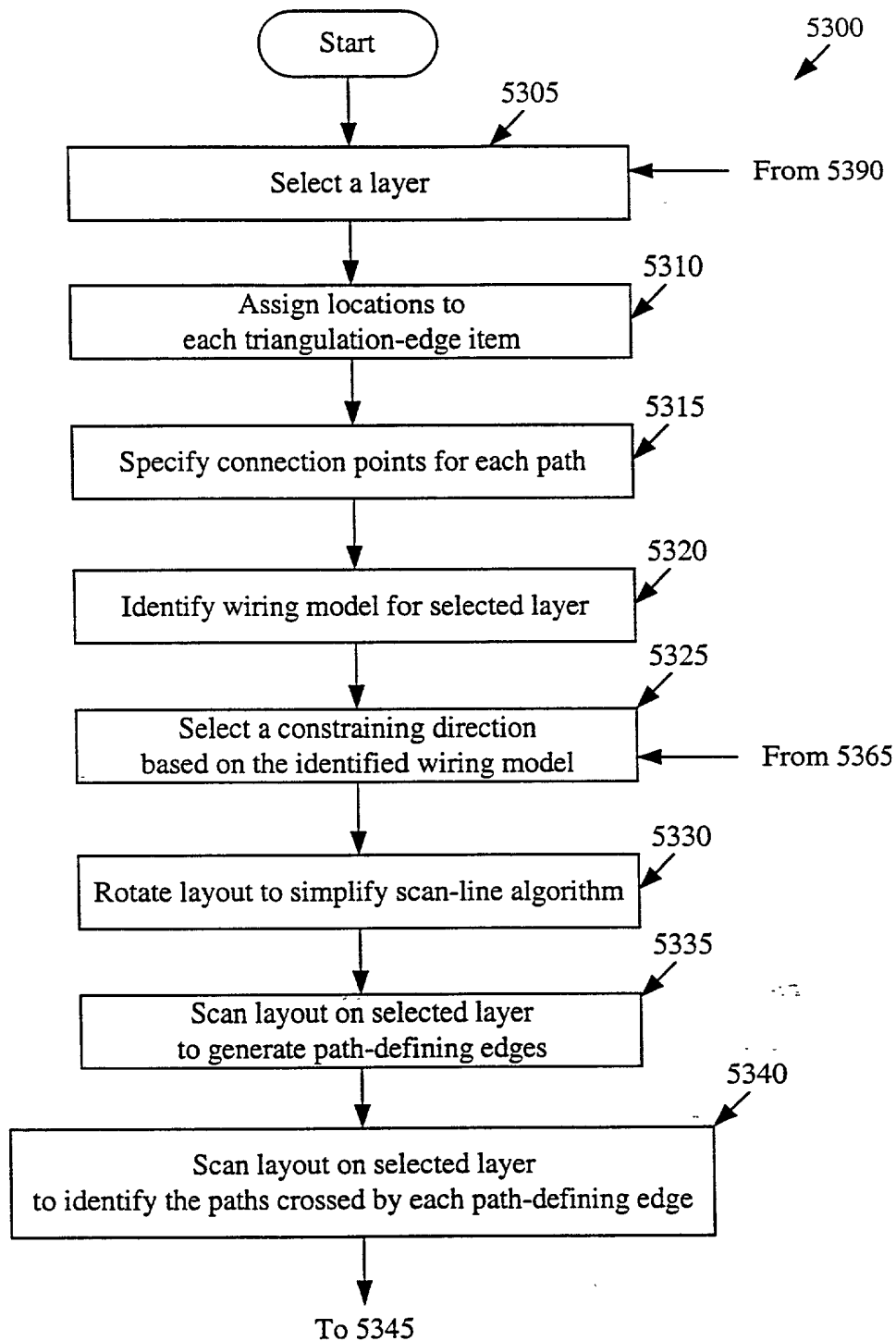


Figure 53

Figure 53: Figure 53A
Figure 53B

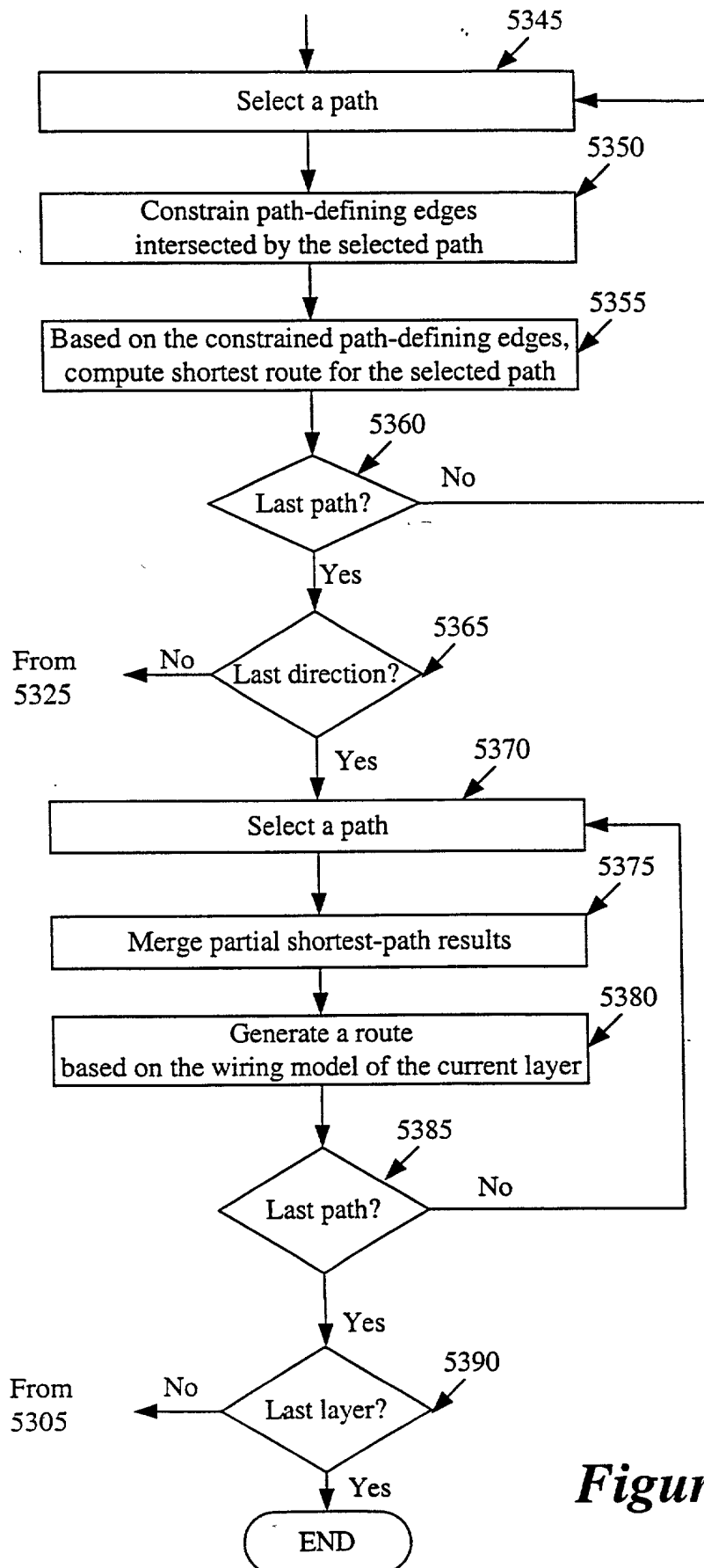


Figure 53B

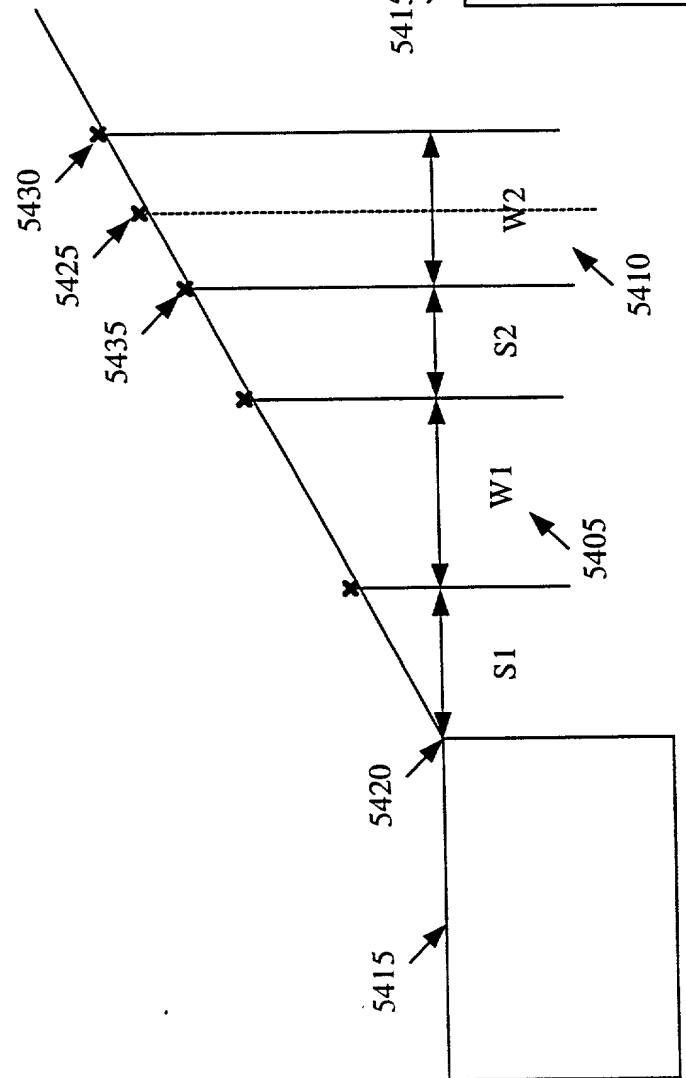


Figure 54

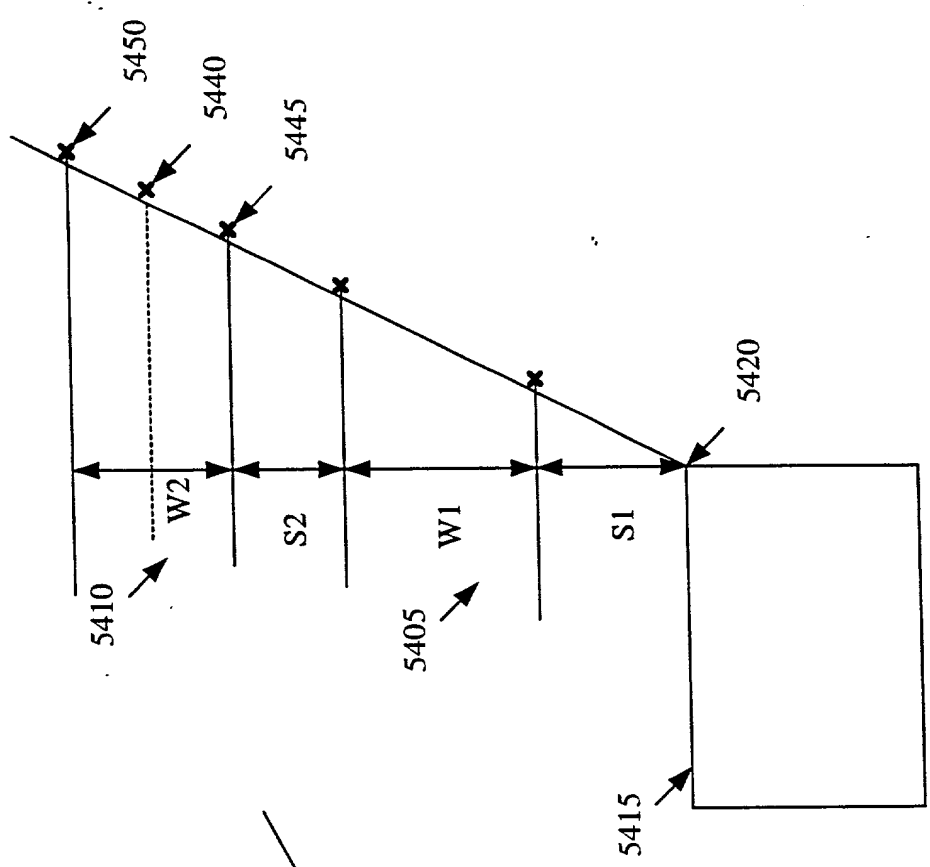


Figure 55

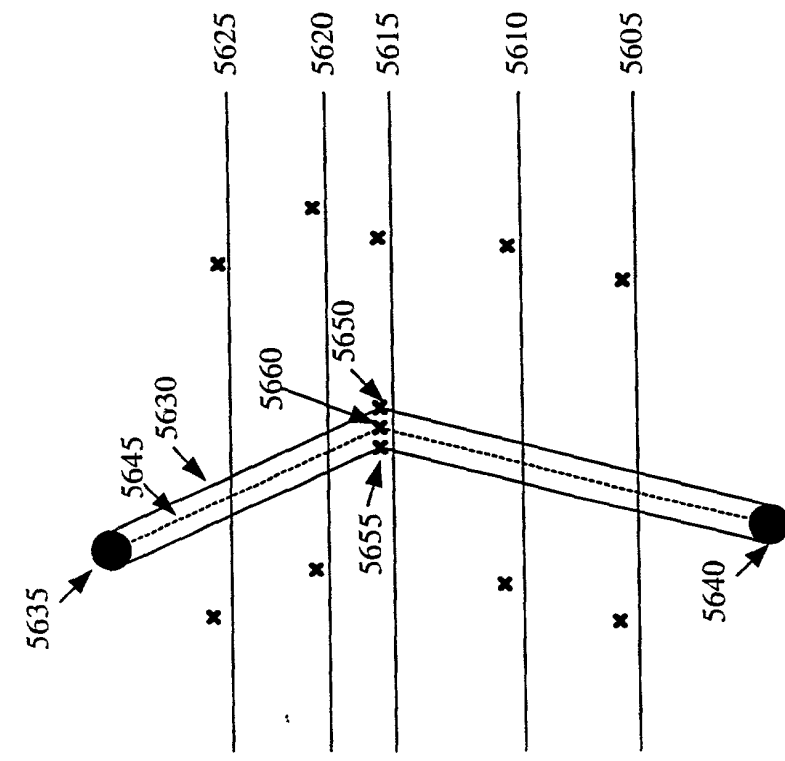


Figure 56

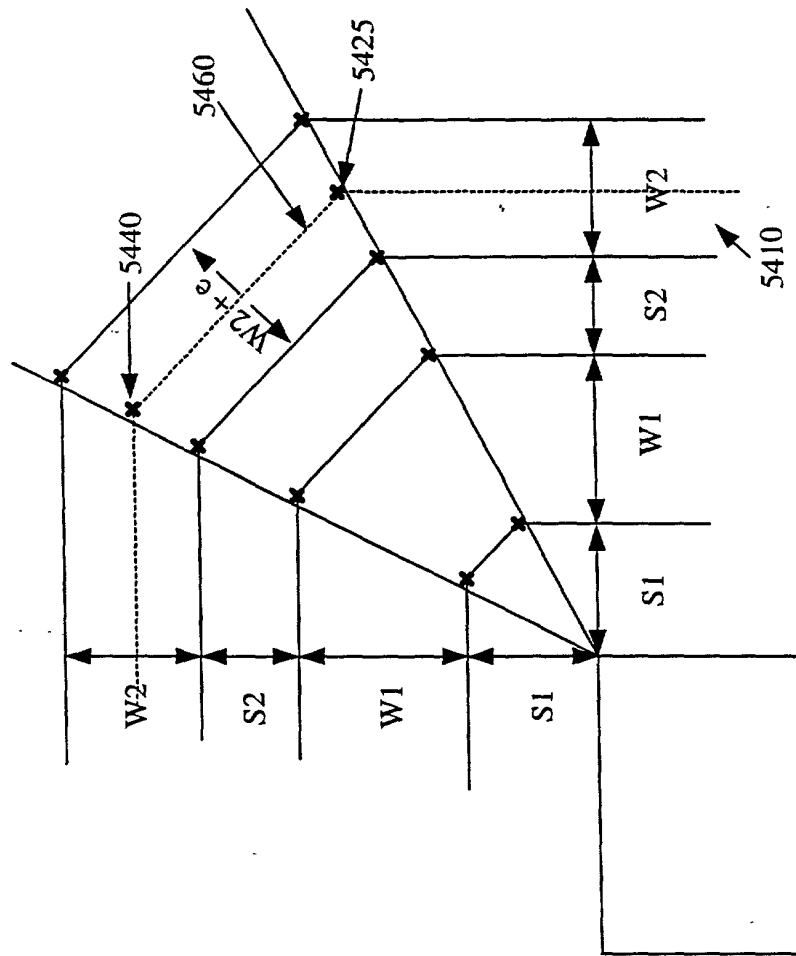


Figure 57

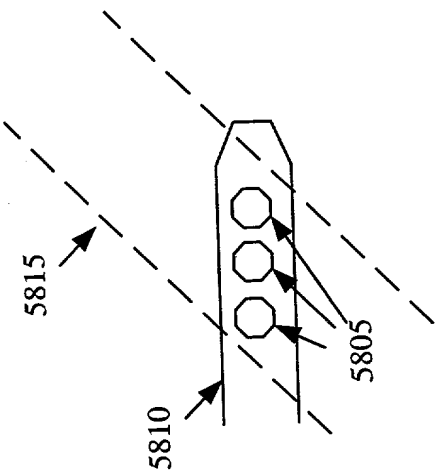


Figure 58

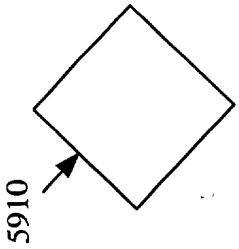
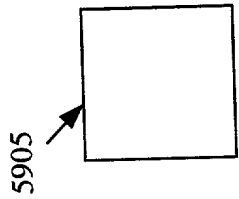


Figure 59

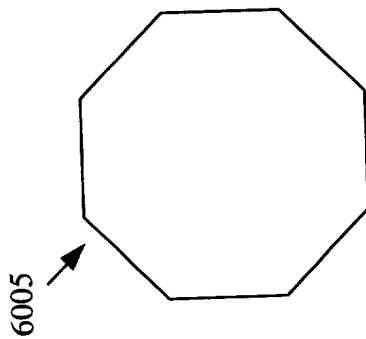


Figure 60

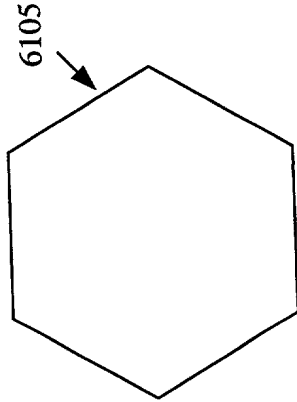


Figure 61

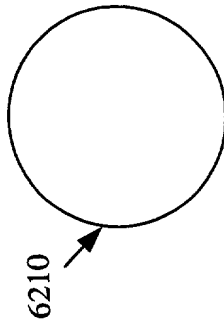


Figure 62

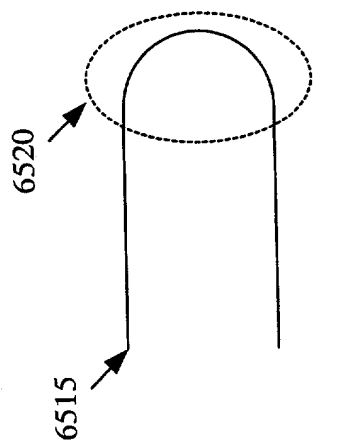


Figure 63

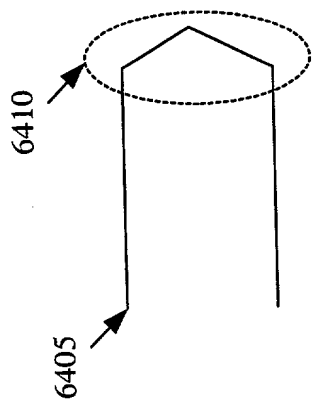


Figure 64

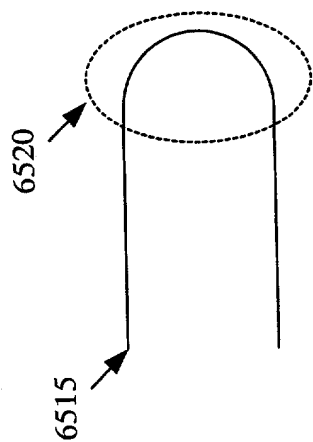
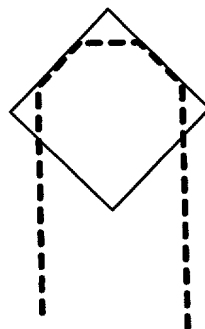


Figure 65

(1)



(2)



(3)

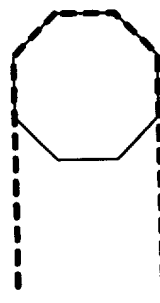
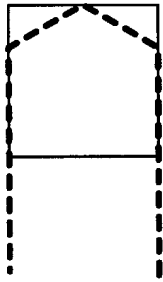


Figure 66

(1)



(2)

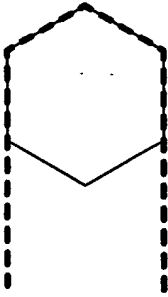


Figure 67

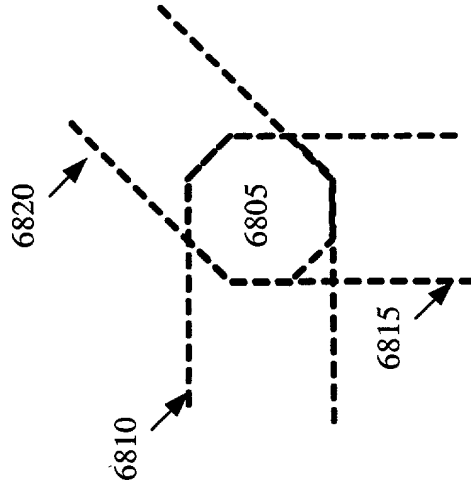


Figure 68

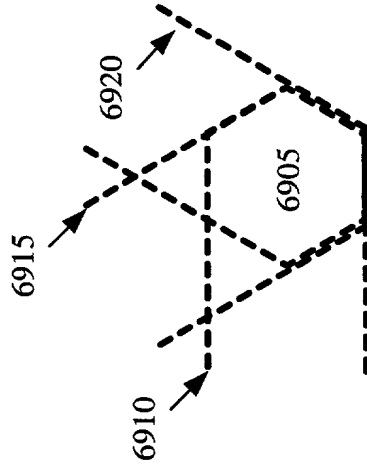


Figure 69

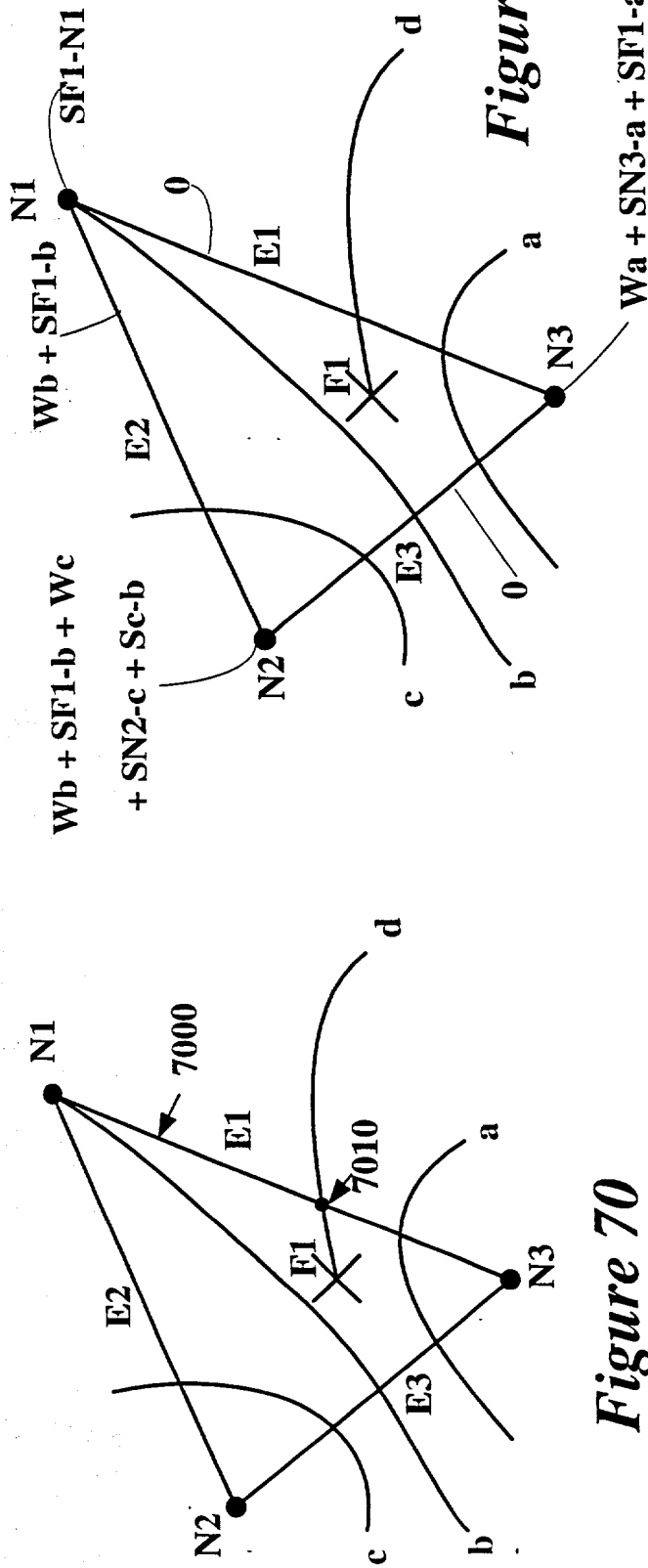


Figure 70

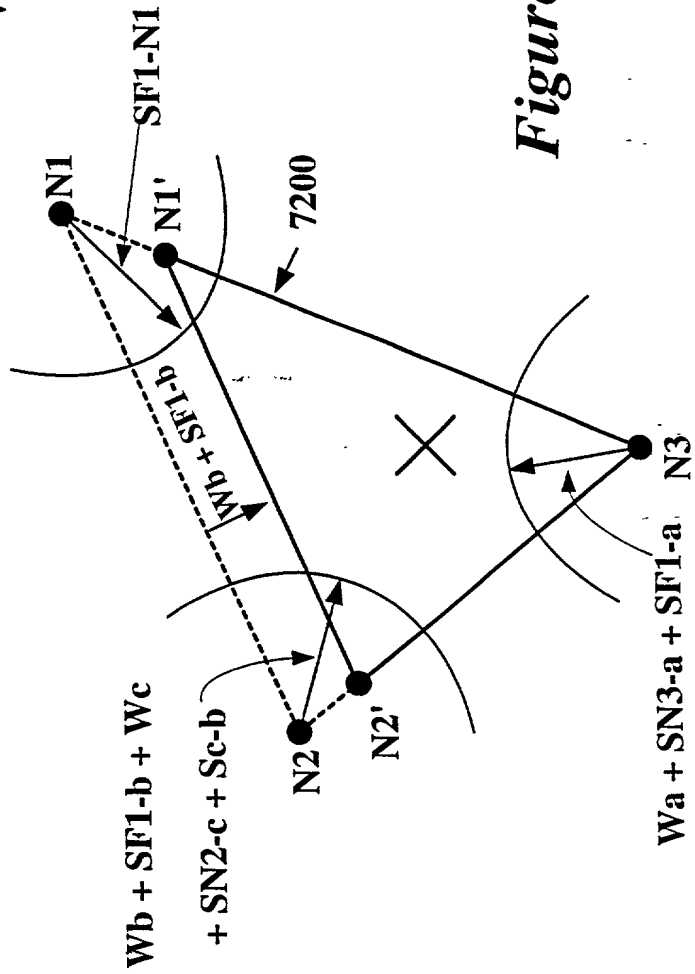


Figure 72

Figure 73 is a diagram showing a network of nodes and edges. The nodes are labeled N1, N2, N3, N1'', N3', and N2'. The edges are labeled E1, E2, E3, F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, F13, F14, F15, F16, F17, F18, F19, F20, F21, F22, F23, F24, F25, F26, F27, F28, F29, F30, F31, F32, F33, F34, F35, F36, F37, F38, F39, F40, F41, F42, F43, F44, F45, F46, F47, F48, F49, F50, F51, F52, F53, F54, F55, F56, F57, F58, F59, F60, F61, F62, F63, F64, F65, F66, F67, F68, F69, F70, F71, F72, F73, F74, F75, F76, F77, F78, F79, F80, F81, F82, F83, F84, F85, F86, F87, F88, F89, F90, F91, F92, F93, F94, F95, F96, F97, F98, F99, F100. The diagram also includes labels for various weights and sums, such as $Wb + SF2-b$, $Wc + SN2-c + SF2-c$, $Wb + SF2-b + Sb-a$, and $+ Wa + SN3-a$. The value 7300 is also indicated.

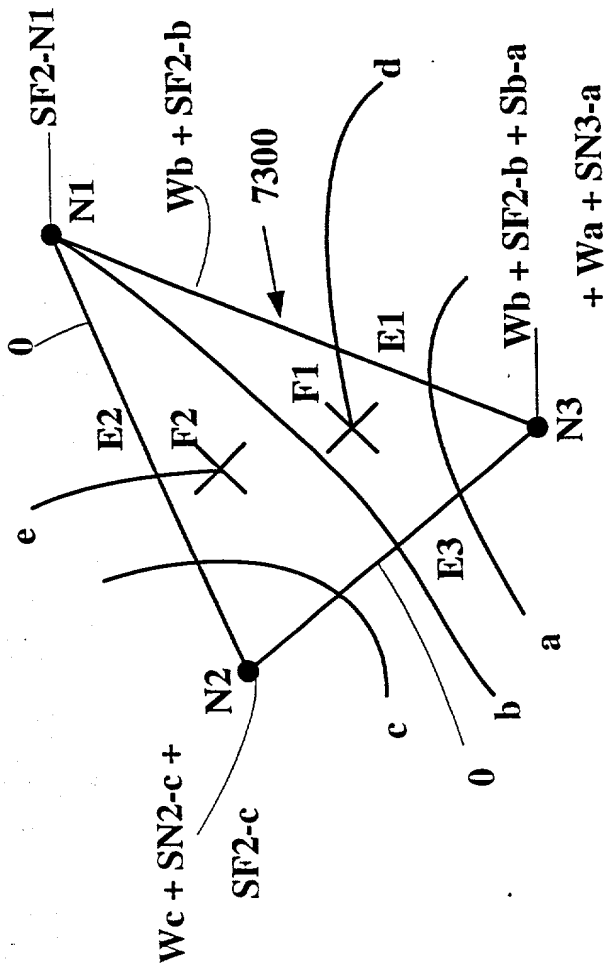


Figure 73

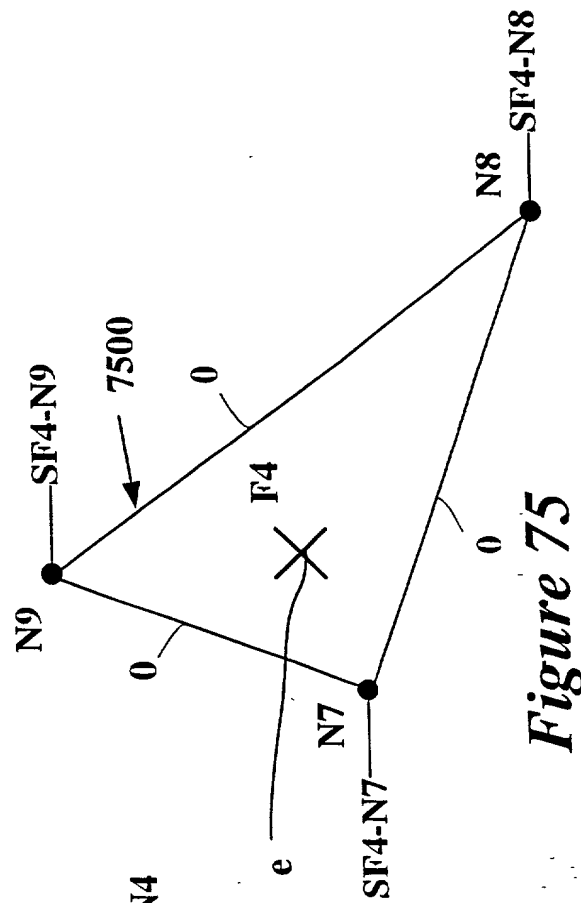


Figure 75

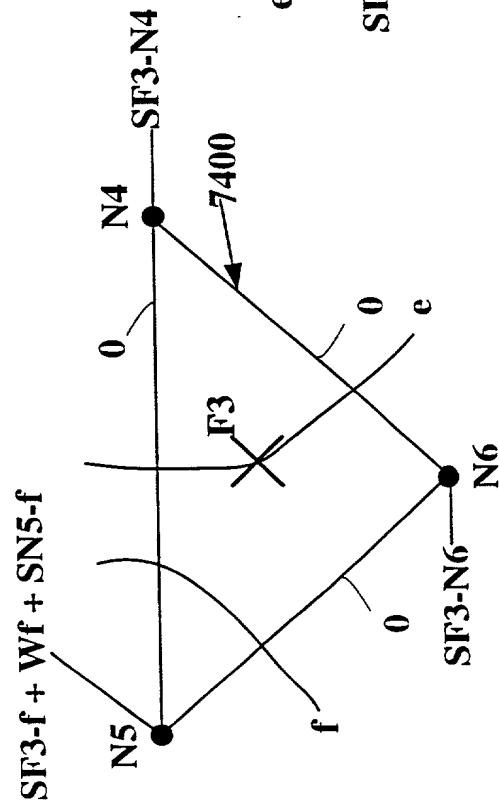


Figure 74

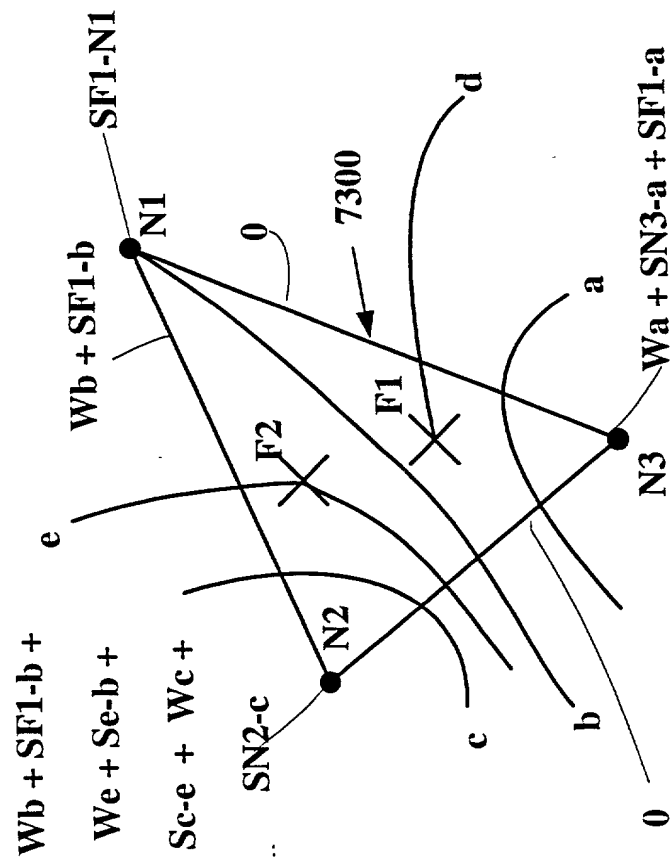


Figure 76

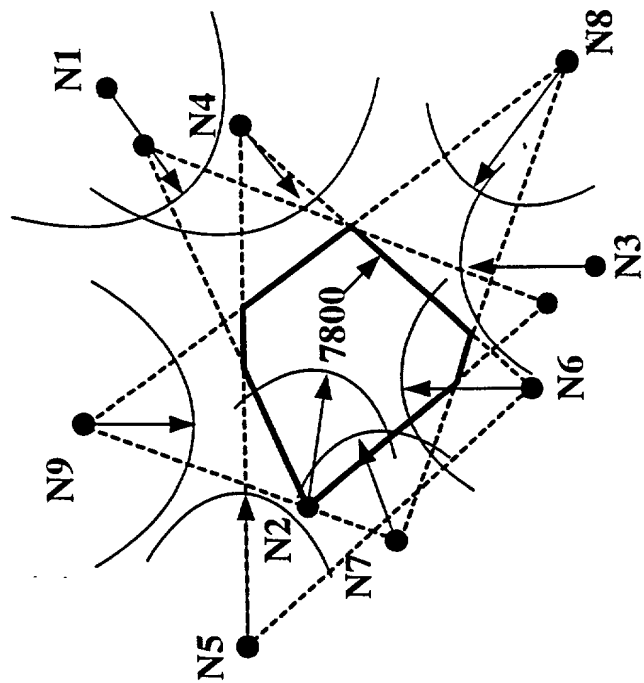


Figure 78

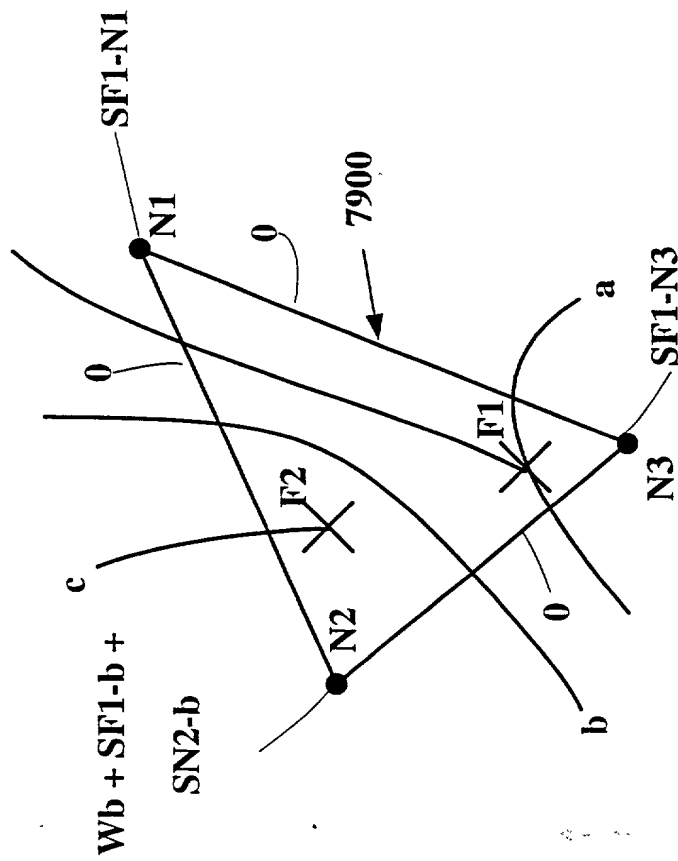


Figure 79

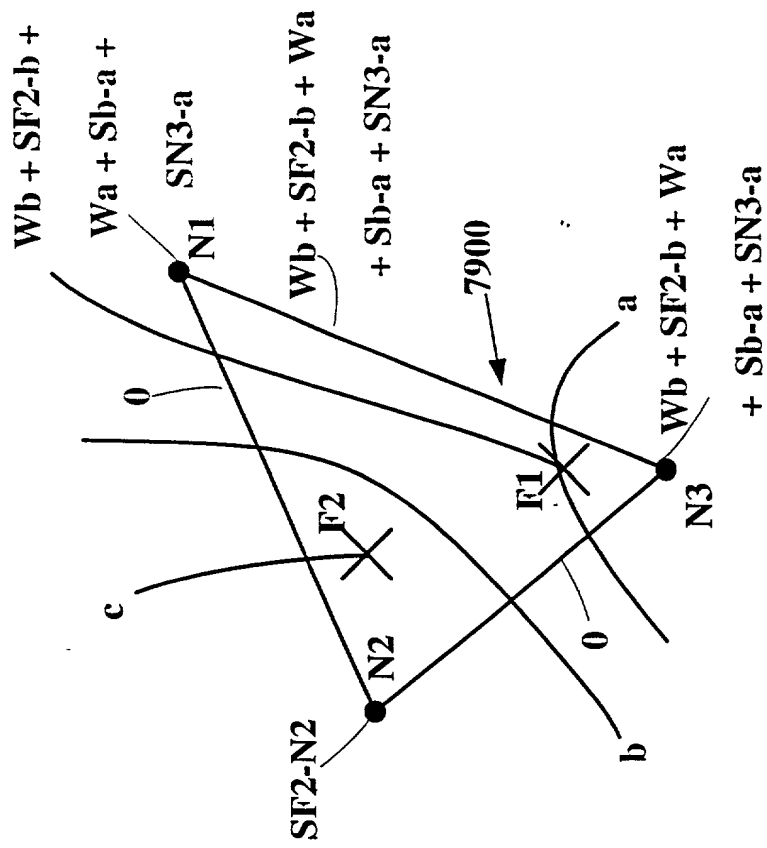


Figure 80

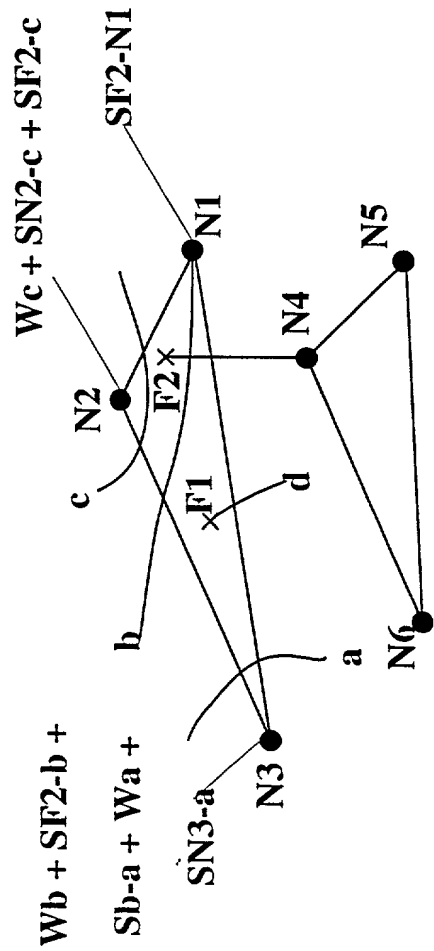


Figure 81

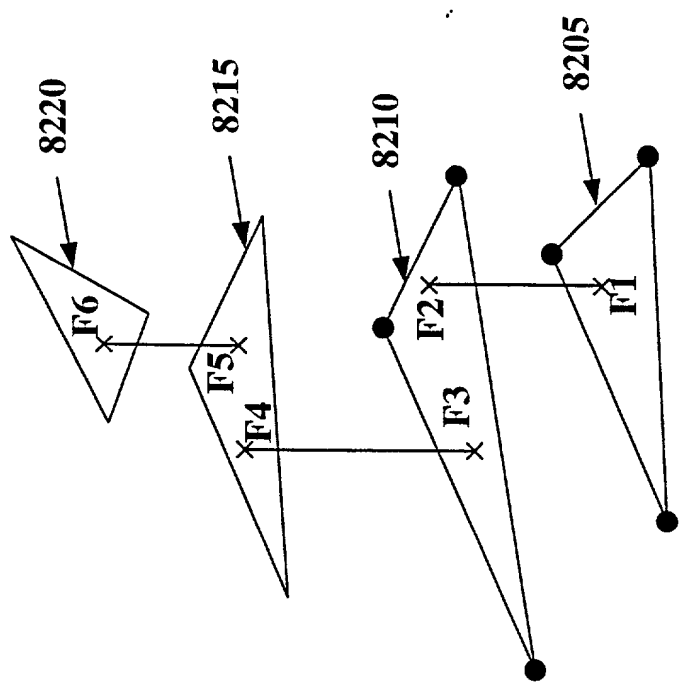


Figure 82

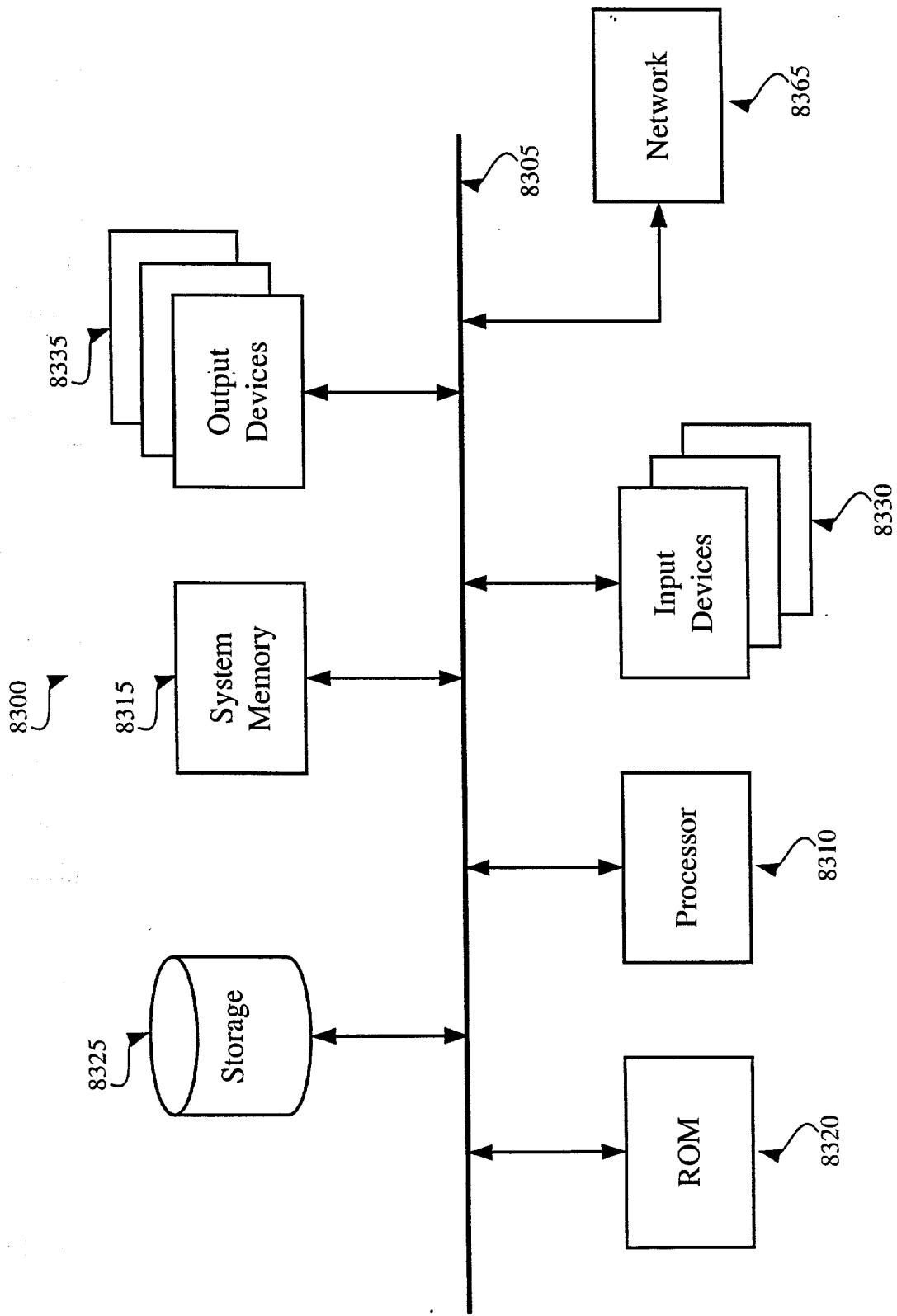


Figure 83